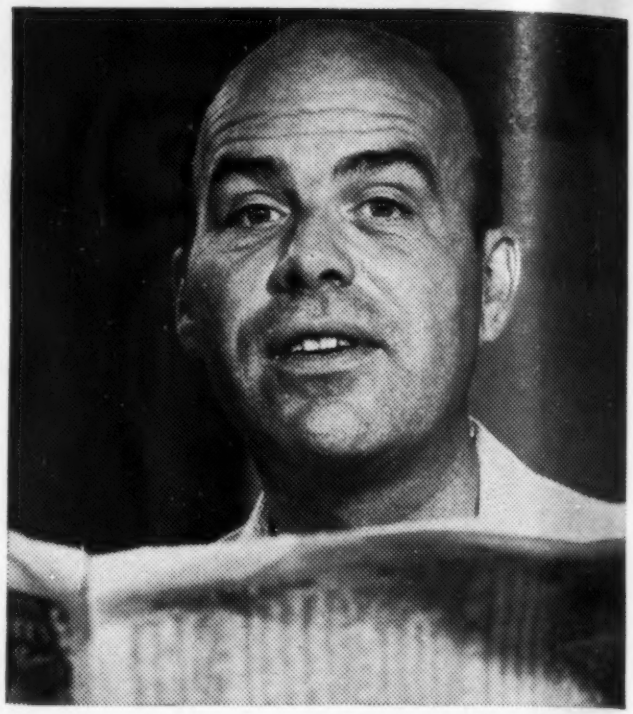
ol. LXIII No. 1 JULY 1961 50 CENTS

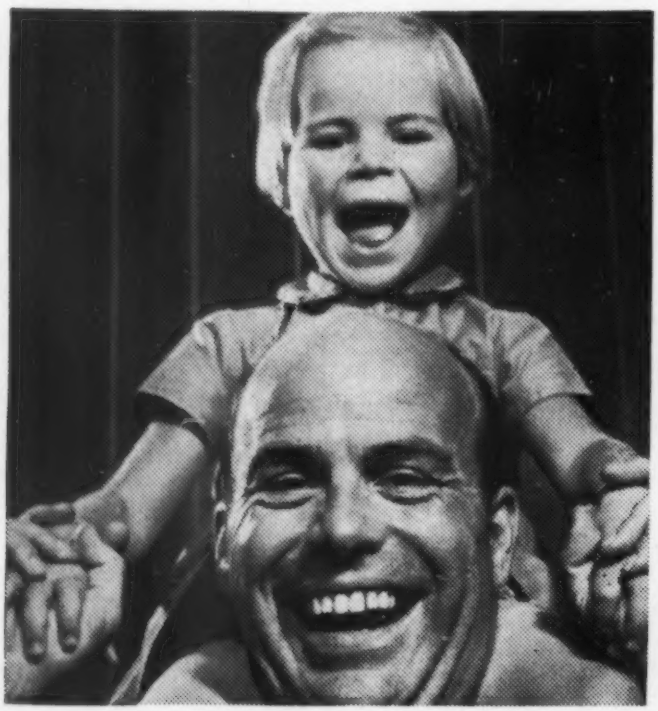
CANADIAN GEOGRAPHICAL JOURNAL

Published by THE ROYAL CANADIAN GEOGRAPHICAL SOCIETY

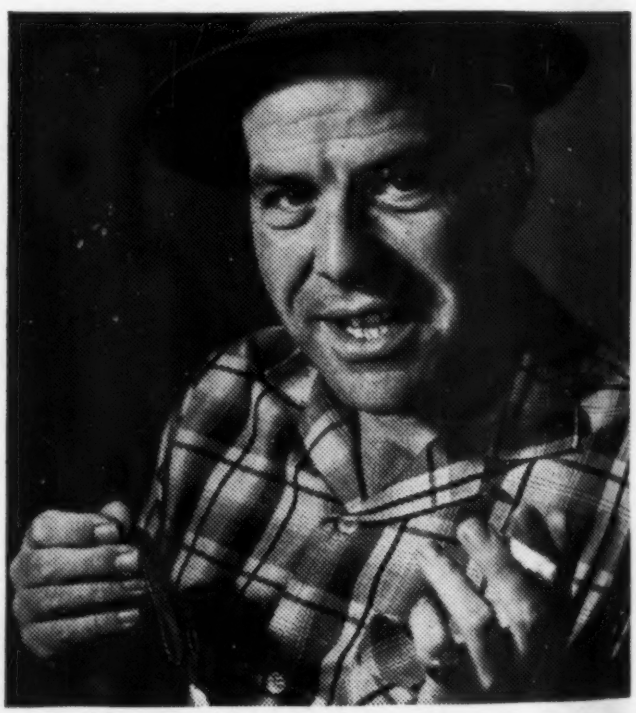
How do I save?



When it comes to saving here's a trick worth knowing. Avoid writing cheques against your Savings Account. Impossible? Not at all!



Simply open a *Personal* Chequing Account at the "Royal"; use this account for paying bills. Keep your *Savings* Account strictly for saving.



The bank calls this the *2-Account Plan*—a sure-fire way to save. It makes sense. It's business-like and it's easy. Why not give it a try?

THE ROYAL BANK OF CANADA

The bank with 1,000 front doors

THESE ARE THE PEOPLE...

... the people of the Royal Canadian Air Force who serve Canada and her allies.

Their tasks are significant, varied and complex. Some fly supersonic jet interceptors, others transport men and supplies in multi-engine giants, or keep aircraft operational and keep watch on our skies. Their success as a team is reflected in the outstanding world-wide reputation of the RCAF.

Find out from your RCAF Career Counsellor about the exciting opportunities for young men and women.

AF-60-4M

ROYAL CANADIAN AIR FORCE

For those who are compelled to work in cities during the hottest days of summer, visits to such scenes as this, near Baie St. Paul, Quebec, afford a welcome relief.

Quebec Province—Photo Driscoll

✦

The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography — historical, physical and economic — of Canada, of the British Commonwealth and of the other parts of the world. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated, and informative.

The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is five dollars (U.S. funds at par).

AUTHORIZED AS SECOND CLASS MAIL, POST OFFICE DEPARTMENT, OTTAWA

PRINTED IN CANADA

CANADIAN GEOGRAPHICAL JOURNAL

Editor - WILLIAM J. MEGILL

CONTENTS

JULY 1961 ✦ VOLUME LXIII ✦ NUMBER 1

COVER SUBJECT:—*Fishing smacks in Neils Harbour, Cape Breton, Nova Scotia.* N.F.B.

✦

The articles in this Journal are indexed in the *International Index to Periodicals* and in the *Canadian Index*.

The British standard of spelling is adopted substantially as used by the Government of Canada and taught in most Canadian schools, the precise authority being the Concise Oxford Dictionary, fourth edition, 1951.

Financial assistance from the Canada Council towards publication of the *Canadian Geographical Journal* is gratefully acknowledged. The fact that a grant has been made does not imply, however, that the Canada Council endorses or is responsible for the statements or views expressed in the Journal.

Address all communications regarding change of address, non-delivery of Journal, etc., to the Head Office, 54 Park Avenue, Ottawa 4, Canada, giving old and new address. On all memberships, the expiry date will be printed on wrapper. This will constitute a receipt for subscription.

Member Audit Bureau of Circulations

Head Office: 54 Park Avenue, Ottawa 4
(Tel. CE. 6-7493)

Printing Office: Gazette Printing Company (Limited), 1000 St. Antoine St., Montreal 3.

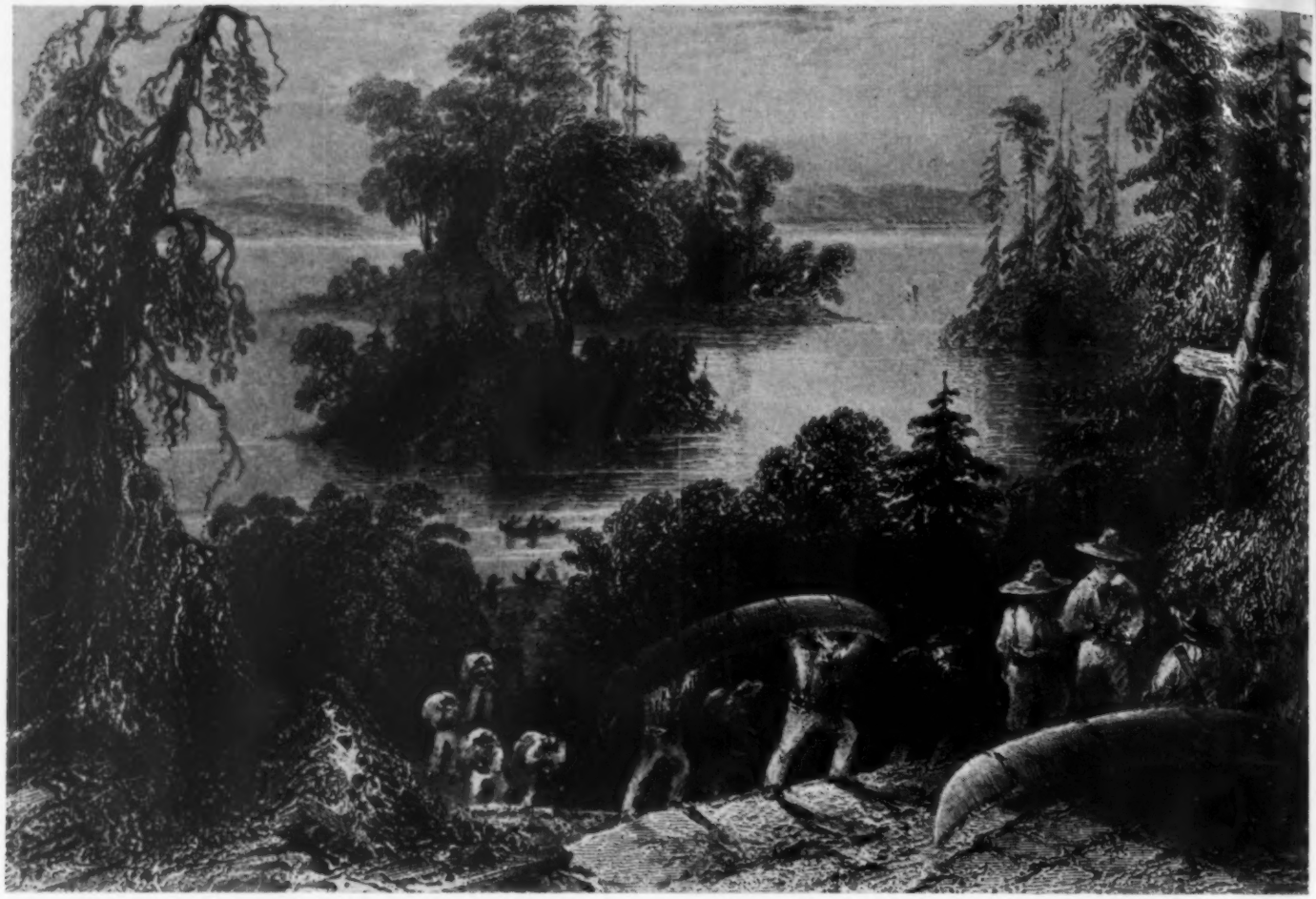
SPECIAL REPRESENTATIVES:

GEORGE F. HENDERSON
1103 Mayor Bldg., Montreal 2
(Tel. VI. 9-3571 or UN. 6-5285)

69 Yonge St., Toronto
(Tel. EM. 3-4170)

Europe: S/L W. H. CORKILL, M.B.E., The Mead, West Dumpton Lane, Ramsgate, Kent, England.

U.S.A.: Professor WILLIAM L. MAYO, P.O. Box 1, Ann Arbor, Michigan.



Two W. H. Bartlett prints, "The Burial Place of the Voyageurs" and "Working a Canoe Up a Rapid". Neither the canoes nor the men's hats are at all accurately depicted, but the terrain in both cases is portrayed so well that the two spots are almost certainly recognizable as being, respectively, the Des Chats Portage looking down the Ottawa, and the lower end of the Portage Dufort (now obliterated by Hydro).

Public Archives of Canada

Voyageurs' Highway

Overcoming Navigational Obstacles

by ERIC W. MORSE

Photographs by the author unless credited

This is the second of a series of three articles about the geography of the fur trade routes and what they have meant to the development of Canada.

THE LIFE AND TIMES of the voyageurs come down to us today largely through the journals of the early explorers. These journals were, however, often very matter-of-fact. In those of Mackenzie, Fraser and Hearne—which are the best—the difficulties and hardships the voyageurs and explorers faced at every turn were underplayed. Fortunately for us today in trying to reconstruct their life on the trail, the lakes and rapids which challenged the voyageurs are still there, altered little if at all, except by the odd hydro dam on the Ottawa or the Winnipeg Rivers. By paddling over the route today one can see and sense just what they were up against—particularly in the places where they met obstacles. The principal obstacles along the Voyageurs' Highway, then as now, can be classified as: *rapids or waterfalls*, *watersheds*, and *very big lakes*.

One does not argue with waterfalls: there is only one way past them, upstream or down—the portage path.

Rapids, however, vary—in drop, in kind, in volume, and from season to season—so there is no single technique to employ. Attacking a rapid upstream, the voyageurs would (in ascending order of necessity) paddle the canoe "demi-chargé", line or pole the canoe, make a "décharge", or portage. Coming downstream they would, depending on its degree of danger or difficulty, run the rapid, make a "décharge", or portage.

Portaging and running a rapid are terms needing no explanation. The others are essentially voyageur terms. Poling is possible where the stream has a fairly shallow, rocky bottom and is small enough in volume that its rapids will not swamp the canoe. Setting poles were long, strong poles, sometimes tipped with an iron ferrule, which were used to push the canoe up the side of the rapid. The voyageurs stood up for this, and though the canoe was well ballasted with cargo, poling was a technique that called for great skill and balance. Two sections of the Voyageurs' Highway where poles could be used to good effect were the Sturgeon-Weir (Maligne) River north of Cumberland House, and the Mattawa River between the Ottawa and North Bay. There was a traditional spot entering Turtle Lake on the Mattawa, in fact, where the voyageurs, with some ceremony and elation, threw away their poles, their up-stream toil having now ended. Going up a bigger river such as the Saskatchewan or Athabasca, swift sections were *lined*, the voyageurs pulling the loaded canoe on a long cord, as a barge alongside a tow path—or wading in the icy water where no path existed.

Where the rapid was too strong to battle in a fully-loaded canoe, too deep for poling, yet did not call for portaging, the voyageurs sometimes took out half the load, paddled madly up the rapid, unloaded, and returned for the second half. This was termed paddling "demi-chargé". For readers who are familiar with the City of Ottawa, an instance of this was in the fast water immediately above the Chaudière Falls. The voyageurs paddled "demi-chargé" from the present site of the E. B. Eddy Company's mill on the north shore to a deep bay a mile up the river where the Second Chaudière Portage began.

At a "décharge" the empty canoe was left in the water and lined up or down, but the cargo was portaged. In fact, except for those voyageurs specially designated to carry the canoe, it was no different from a portage. The place for a "décharge" was a very shallow rapid, or a dangerous ledge under the water which would break the back of the canoe when loaded.

The most dramatic, exciting, and least strenuous way to pass a rapid going downstream, of course, was to run it. White water was the icing on the voyageurs' cake. The two

A typical rapid on the Churchill River (Rapide des Epingles). The procession of turbulent, standing waves can be seen down the centre, the sharp rocks near shore. The "fil d'eau" is clearly distinguishable between the two.

main hazards in running a rapid are rocks below and turbulence above; the one can puncture the canoe and the other swamp it. A big "canot de maître", being made of birch bark, was very vulnerable to rocks; and it was usually so heavily laden as to allow very little freeboard for keeping out the waves. Rapids varied in depth in the spring and fall. High water increased the turbulence, but covered the rocks—which of course also worked conversely. This rapid could be run on the voyageurs' spring journey; that one could be run on their return trip at low water in August or September. Some rapids varied even from one year to another, both as regards the course to run and whether to run at all.

To offset the disadvantage of a frighteningly vulnerable craft, the voyageurs had the advantages of skill and experience. In charge of a "brigade" was the "Guide". He stood in the bow of the leading canoe; he had gone over and over the course to take for each rapid, as he had risen over the years from common voyageur or "milieu", through the ranks to his present position. The top man in each canoe, the "Avant", stood in the bow; the "Gouvernail" stood in the stern and steered with his long "sweep" paddle.

Normally in a rapid, one avoids the shallow edges where there are rocks and strong eddies. Likewise there is danger down the middle from turbulence, for here are the big standing waves, or "haystacks". Most runnable rapids have a reasonably obvious course, outside the central turbulence yet away from the shore. The voyageurs knew this as the "fil d'eau", which is difficult to translate except as the "canoe course". Simon Fraser in his account of running the river that bears his name speaks of this when he relates: "The great difficulty consisted in keeping the canoes in the medium, or *fil d'eau*, that is to say, clear of the precipice on the one side, and of the gulphs formed by the waves on the other. However, thus skimming along like lightning the crews, cool and determined, followed each other in awful silence.".

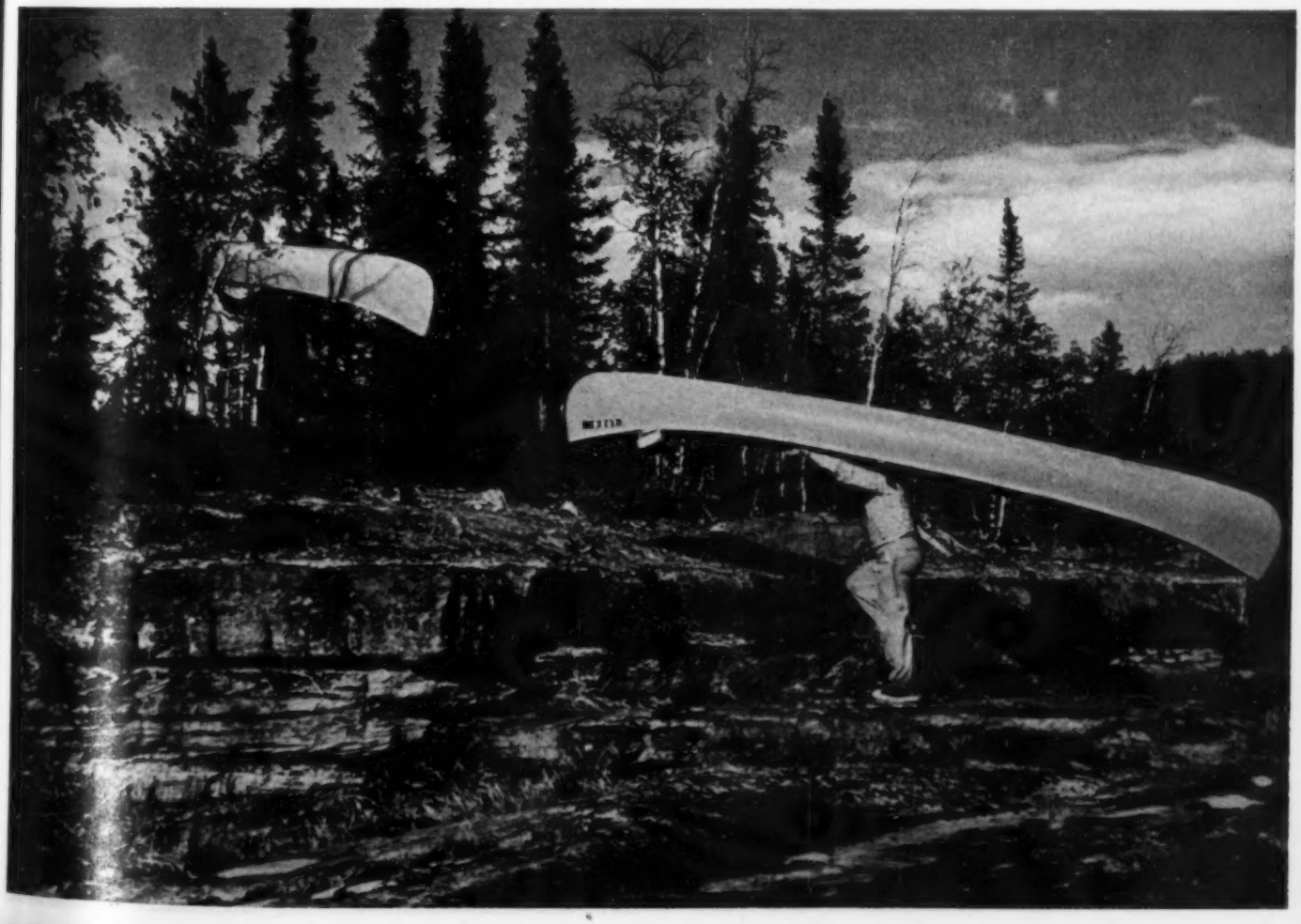
Finally, there was *portaging*. In passing

obstructions, the voyageurs regarded portaging as a last and inescapable extremity — for whenever they left the water, the canoe itself and everything in it had to be carried on the men's backs and necks, and sometimes over a rough, steep or boggy path. A "canot de maître" weighed about 600 pounds; a North canoe, about 300. Each voyageur carried over the portage 540 pounds in three 180-pound loads. This understandably coloured the voyageur's whole approach to portaging, and in some cases to the route he took. An instance is the section of the Ottawa River between Renfrew and Pembroke. The old Indian route up the Ottawa left the main river and crossed over to the Muskrat River (followed by the Canadian Pacific Railway); Champlain used this in his day. However, the Indians and Champlain travelled light; they didn't mind long portages in order to save miles. The fur traders kept to the Ottawa though it was much longer; they went so much faster on water than on land that it more than offset the extra mileage.

A brigade of canoes arriving at a portage was a scene of great activity. The loaded birch bark canoe must not touch land for fear of damage to its skin. As they approached, out leapt the voyageurs up to their waists in water and speedily unloaded the canoe. All the trading goods and the furs had been made up into "pièces", each weighing about ninety pounds. A voyageur quickly slung one of these on his back, with a tumpline over his forehead pulling his head back. Into the hollow thus formed he tossed a second ninety-pound pack which pushed his head forward. Recognizing this as an unhappy condition to be terminated as soon as possible, the voyageurs half-ran, not walked—and many an earlier traveller recorded his own inability, unloaded, to keep up with them.

If the portage was anything over half a mile, the voyageur sensibly didn't go the whole way at once; he put down his load at a set place known as a "posé", went back for his next load, and in this way better distributed his loaded and unloaded periods. Mackenzie recorded three miles an hour as an average rate for portaging such staggering loads. However, a mile portage required the voyageur to walk *five* miles—three times over,

Sixteen-foot Prospector canoes being portaged. Normally, it took four men to portage a "canot de maître", two for a North canoe.



loaded, and twice back; this would take about two hours altogether to accomplish, to make a total net rate of half a mile an hour.

It is important to stress that the fur-traders did not *make* the portages. These paths went back perhaps 10,000 years, to the end of the last Ice Age and the coming of the Indians to this latitude. In a land without road or rail, a portage is the key to travelling. Around every unnavigable obstruction there was a path. Perhaps the first one made was not the best. One day, a brighter brave, a more purposeful squaw would cut off a corner, and the path would be changed. Refined in this way to its ultimate, it became established centuries ago.

The three determining considerations in order of importance (which also operate as a "law" for locating portages) are:

(a) The *shortest distance* necessary to walk—from the lip of the first fall to the foot of the last fall, and in as straight a line as is consonant with the following two considerations.

(b) Over the *lowest elevation:* a 180-pound load is all the argument required here—enough sometimes to justify a considerable violation of precept (a).

(c) As far as possible *avoiding soft ground*: the voyageurs started off in May; and a man plus 180 pounds at that time of year can go only one way in a swamp—down.

Where the portage climbed a sharp rise, the voyageurs often constructed crude, low, stone "steps", large flattish stones which over the years would lock themselves firmly in place. Four or five sets of these stone steps are to be found on the two or three historic portages still partly traceable along the Ottawa River, one of which is illustrated on the opposite page.

Today, canoeing down a big river like the Churchill without guides, locating portages is a matter of survival. On the Churchill and Sturgeon-Weir Rivers, in the 500 miles between Ile à la Crosse and Cumberland House, as an example, there are about a hundred rapids, of which two-thirds can be

Loaded canoe being lined past a shallow ledge above Thompson Rapids on the Fond-du-Lac River in northern Saskatchewan. This is the rapid where David Thompson nearly met his end in 1796.

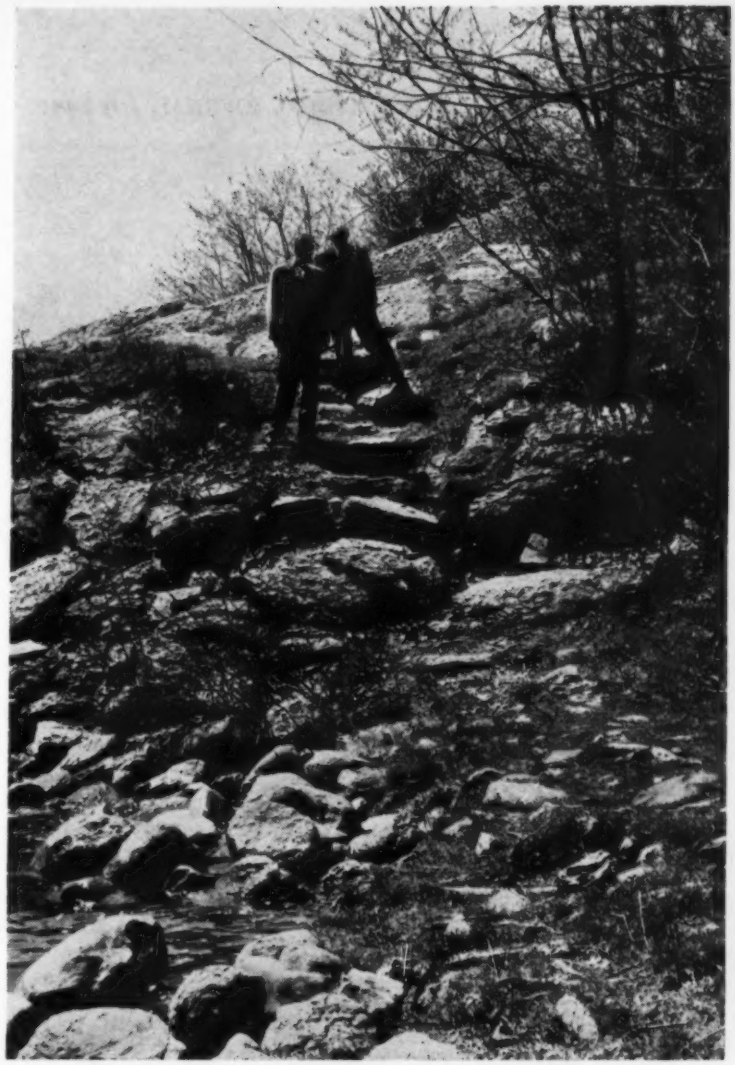
run. The warning roar of a rapid is usually heard for up to a mile ahead; finally around a bend its first plumes of dancing spray are seen. The map is not always a safe guide as to whether it should be run or portaged. Even local bands of Indians or those at Hudson's Bay Company posts are not always to be relied on: both the language barrier and varying water conditions would make it unsafe to take advice for gospel. But there is one good rule of thumb: look for the portage. If there is a portage, and if its condition indicates that it is used for both up and down-stream traffic, it is there for a reason—no matter how safe the rapid may *look* for running, from the top.

These portages have not changed even since the fur-traders abandoned them. In a roadless country such as northern Saskatchewan they are essential to local travel. The traffic of Indians, missionaries, prospectors, and fishermen keep the portages open and in good condition.

Another factor in keeping portages open obviously is game. In some of the country on the Fond du Lac River between Lakes Wollaston and Athabasca, there are no Indians living and therefore no human traffic. The portages are, nevertheless, easy to find and in good shape; along them are tracks and droppings of moose, caribou, wolf and bear. Most convincing in this respect was a cove the writer saw in 1960 on the loneliest part of Lake Superior's north shore, west of Michipicoten. The sandy beach was a maze of moose tracks, and leading into the beach from both ends were moose trails exactly matching in width and surface the best portages on the Voyageurs' Highway.

Between Lachine and Mattawa along the Ottawa there were eighteen historic portages. Of these, today only the Second Chaudière and the Des Chats (both near Ottawa) are even partially identifiable, all the rest having become victims of industrial sites, canal building or hydro development.

The scenic *Portage Dufort* at the upper end of Lac Des Chats disappeared under a power development in the 1940's, which drowned out also the *Des Sables, Mountain*, and *Derigé* rapids. The *Grand Calumet* portage, over a mile long, went when the Bryson Dam was built. The huge Des Joachims development



Set of crude stone steps and rock causeway built by the voyageurs on the Second Chaudière portage, across the river from Ottawa.

drowned out everything for seventy miles, from just above Deep River to Mattawa Village — including the celebrated and scenic *two Des Joachims, Roche Capitaine* and *Deux Rivières* portages.

Another eighteen historic portages lie along the Mattawa and French Rivers and over the intervening divide. Only three of these, the *Plein Champ* just above Mattawa, and two of the three *La Vase* portages have gone. All the rest, including the celebrated *Paresseux, Talon*, ("which for its length", wrote Mackenzie, "is the worst on the communication"), main *La Vase, Chaudière des François, Parisien*, and *Recollet* are probably just as they were when Brulé first saw them in 1610; most of these historic names, in fact, are still to be found on modern topographical maps.

West of Lake Superior to Lake of the Woods along the Grand Portage route again, the portages (except for two or three along

the precipitous Pigeon River) are clearly identifiable and in current use. Canoe parties pass regularly along the border lakes route; there are no customs or immigration formalities along this part of the border for, by treaty, all the portages have been internationalized. Between Lake of the Woods and Lake Winnipeg along the Winnipeg River, it is like the Ottawa River: the power-hungry metropolis of Winnipeg has squeezed every kilowatt of power out of the river, in a series of hydro dams; and most of the historic portages have disappeared. However, west of Lake Winnipeg only Grand Rapids at the mouth of the Saskatchewan River appears for the foreseeable future to be threatened by a power development. Along the Voyageurs' Highway from Cumberland House to Lake Athabaska the historic portages are in constant use by the Indians as links in the only surface transportation available except in winter-time.

"Watershed terrain has certain well-recognized, and mostly unpleasant, characteristics . . ." Paddling through a "hairy" lake, above, and hauling over a beaver dam, below.

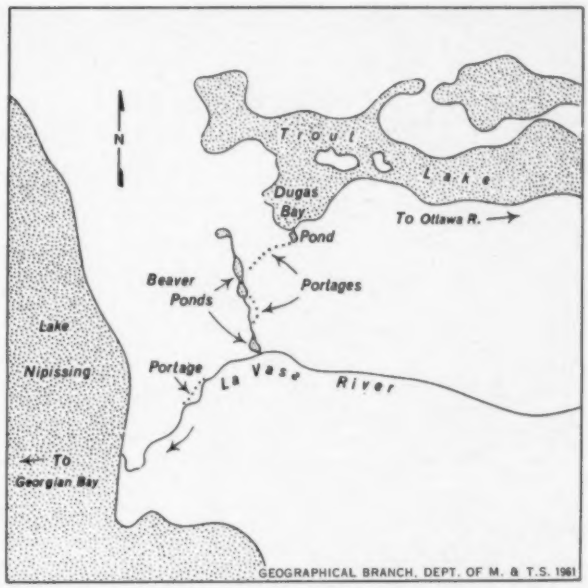
The complete list of the eighty-or-so historic portages west of Lake Superior, with their exact pacing, is to be found in Alexander Mackenzie's "General History of the Fur Trade" in his *Voyages From Montreal To The Frozen And Pacific Oceans.*

Watersheds

The term "watershed" is sometimes loosely used for a whole drainage basin. More accurately it is only the rim of the basin, or the divide, and hence is an obstacle to canoe navigation. Here the canoes have to leave one waterway and move to another. The Voyageurs' Highway between Montreal and Fort Chipewyan passed over no less than four divides (two of them continental)—at *North Bay*, at the *Height of Land* just west of Lake Superior, at *Frog Portage* and at the *Methye Portage.* The Hudson's Bay Company Hayes River route passed over only one divide, at *Painted Stone Portage*, between the Nelson and the Hayes Rivers.

The map of the waterways of the fur trade at the beginning of this series shows how short a distance one has to portage between Canadian river systems. All the rivers link fingers. The Red River rises practically in the same lake as the Mississippi; there are around the rim of the St. Lawrence basin no less than eighteen well-recognized "gateways" closely connecting the St. Lawrence with adjoining basins. The only watershed carry of formidable length east of the Rockies in Canada is the thirteen-mile Methye Portage. The main difficulty at watersheds is not therefore the distance to be portaged, but the type of country one finds. Watershed terrain has certain well-recognized, and mostly unpleasant, characteristics: bad drainage, swamp, shallow mucky ponds, and source-streams that often are only rocky trickles. Each of the five divides mentioned above presented to the voyageurs its own particular challenge, and deserves to be treated separately.

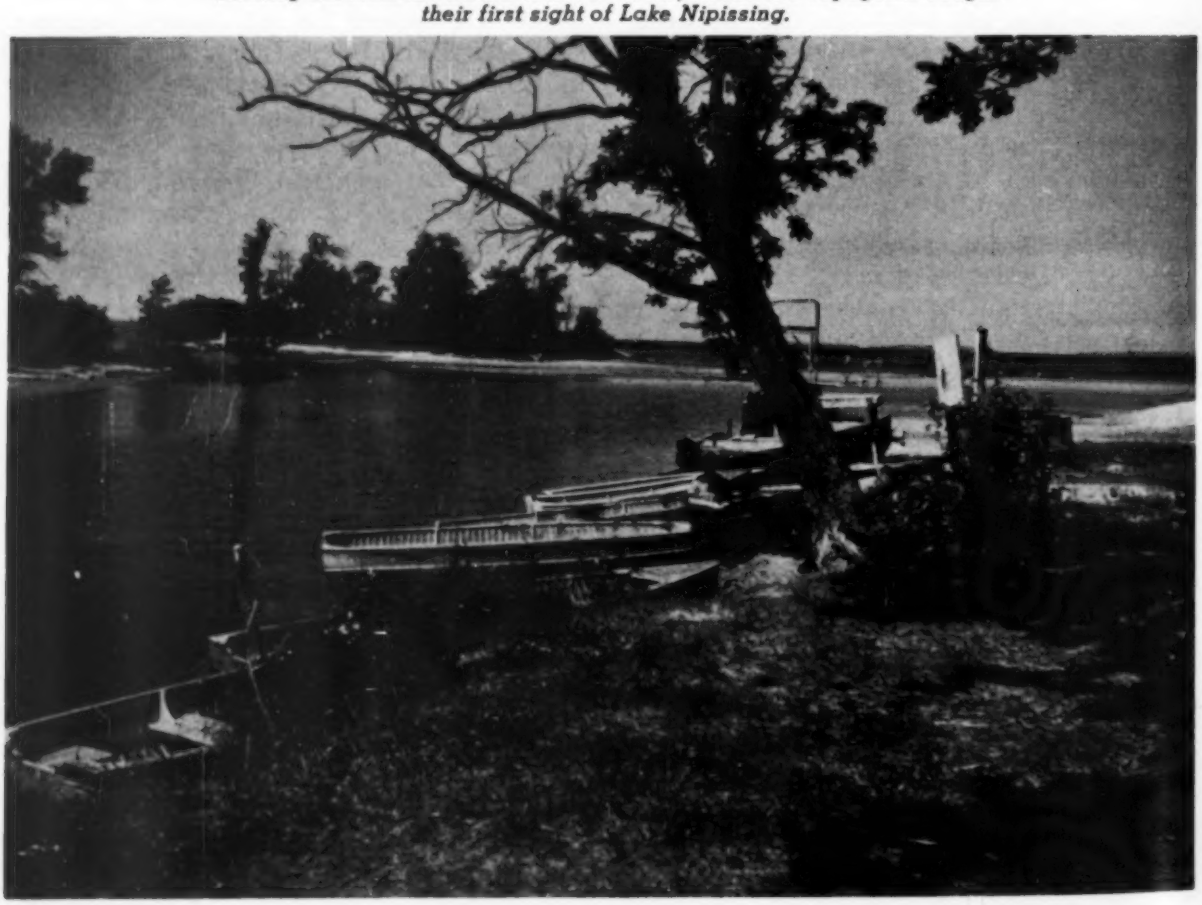
The *North Bay Divide* is one of the most interesting on the continent. From one side of what is now North Bay, Trout Lake drains down the Mattawa into the Ottawa River; on the other side is Lake Nipissing which drains into Georgian Bay via the French River. Between these two lakes lies



a series of low granite ridges, three or four miles at its narrowest. However, the terrain is so rough that it would be impossible to go straight across it, even unloaded. The key to crossing this divide is a stream, the La Vase, which was named for its muddy, swampy character. From Dugas Bay on Trout Lake a fairly level portage nearly a mile long took the voyageurs over the divide. At the other end they hit a tiny creek, a tributary of the La Vase, and launched their big Montreal canoes in a beaver pond about two miles long. A half-mile portage then led from above the beaver dam at the foot of this pond, past some fast water to a second beaver pond, after which they were on the main stream of the La Vase. The lower country here was too flat and swampy for the beaver to dam; the big canoes ran down the winding creek just wide enough to take their six-foot beam, with rushes often brushing both sides of the canoe. Once on the main La Vase, there was only one more obstruction, a fast, rocky section below the point where the Canadian Pacific Railway turns north, and the highway bridge crosses. Here they portaged three-fifths of a mile, then put into the La Vase again, from which point it was straight going to Lake Nipissing. The whole distance over from Trout Lake is about seven miles, of which about two miles is portage. Soon after 1800, however, when the beaver became temporarily exterminated in the area, the beaver

"The big canoes ran down the winding creek just wide enough to take their six-foot beam."
The main La Vase where it is joined by its tributary stream from the north.

Looking out from the mouth of the La Vase, where the voyageurs caught their first sight of Lake Nipissing.



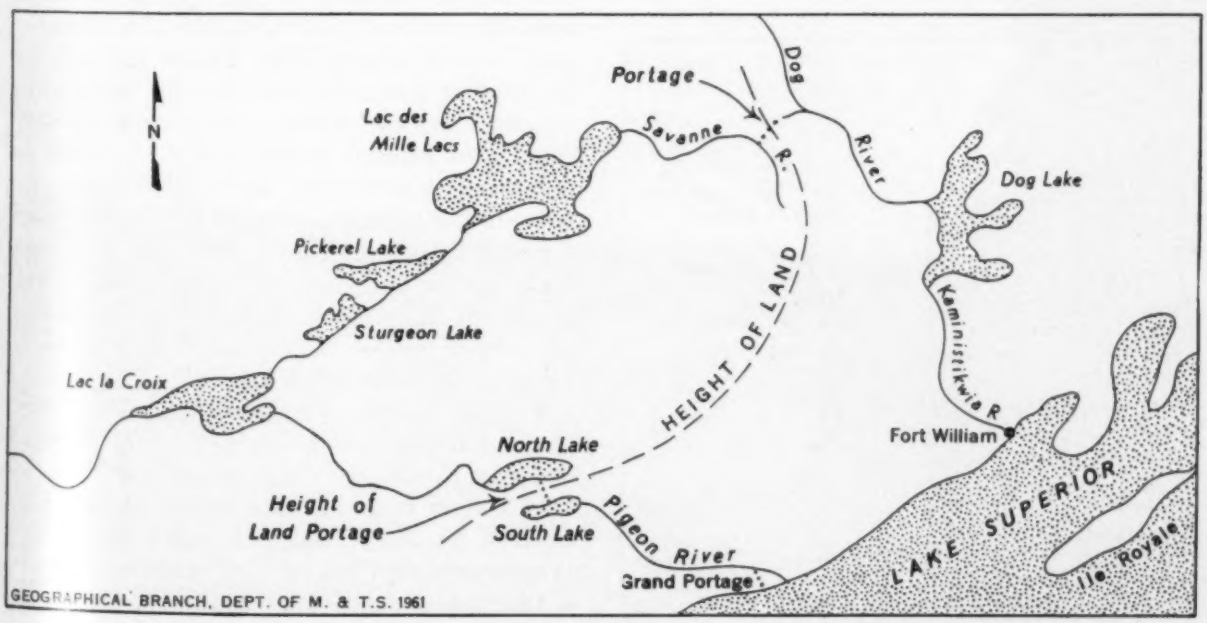
dams went out and this doubled the portaging distance, because it took out about two miles of beaver pond along the little tributary of the La Vase, too small in its natural condition to take the big canoes.

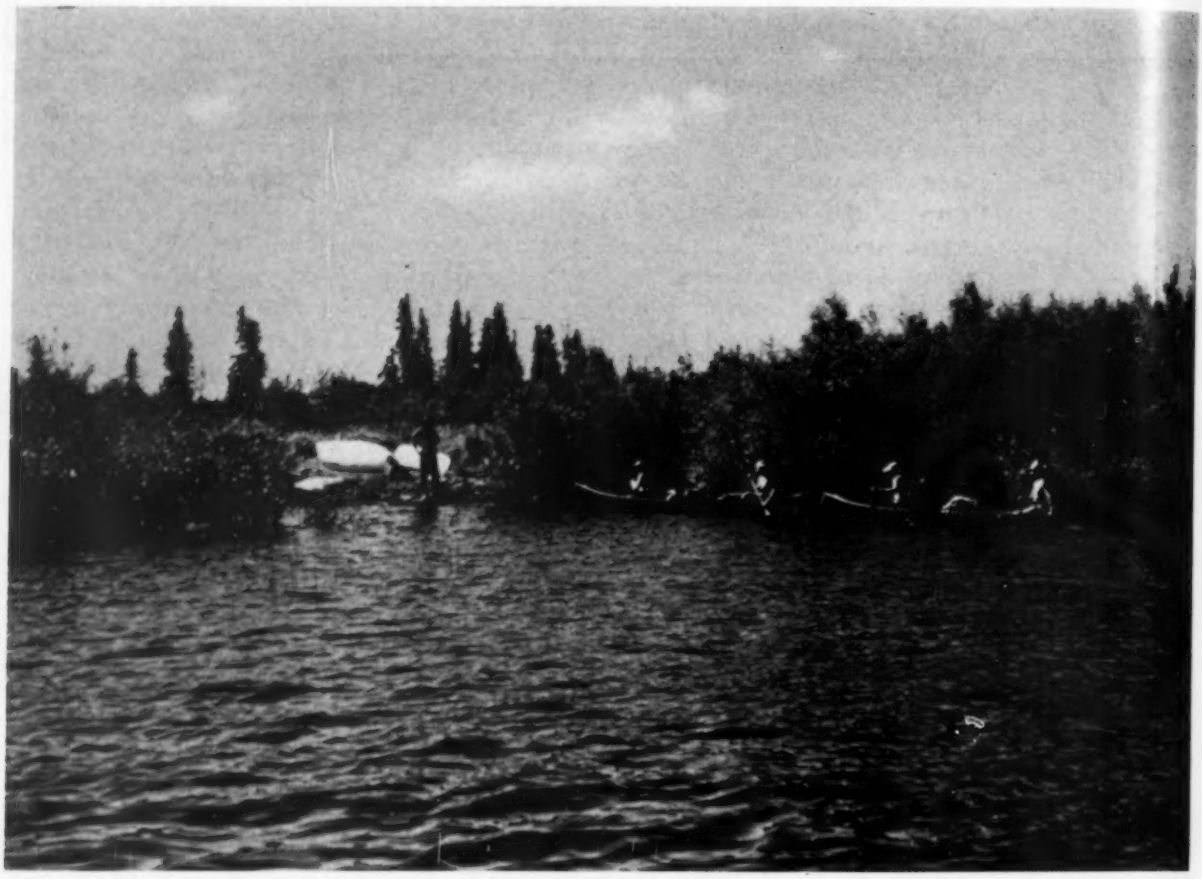
The main La Vase portage from Dugas Bay over to this tributary is still clearly identifiable and unchanged, and in fact, almost exactly as described by Alexander Henry in the 1760's—because now the beaver are back. The Ontario Archaeological and Historic Sites Board plans to mark the north end of the portage (on Highway 17) with a plaque in 1961. The other two La Vase portages have been practically obliterated, though their location is obvious, because the controlling features are sections of bed rock. The accompanying sketch map shows the route over the divide.

The second watershed which the Voyageurs' Highway crossed going westward was a continental one. The *divide west of Lake Superior* is very close to the Lake—as close as fifty miles. Though the approach was a stiff ascent (1000 feet in twenty-five miles on the canoe course) nothing could be simpler than crossing this continental divide on the Grand Portage route. Height of Land Portage crosses a low, flat rocky ridge and is only 680 paces. On one side of the portage lies South Lake flowing into the Atlantic; from the other side, North Lake flows into the Arctic Ocean. It was at this point that the voyageurs held a sort of crossing-the-equator ceremony as they inducted novices passing this point for the first time, to become "hommes du nord". Thus far they had been derisively known as "mangeurs du lard" or Pork Eaters.

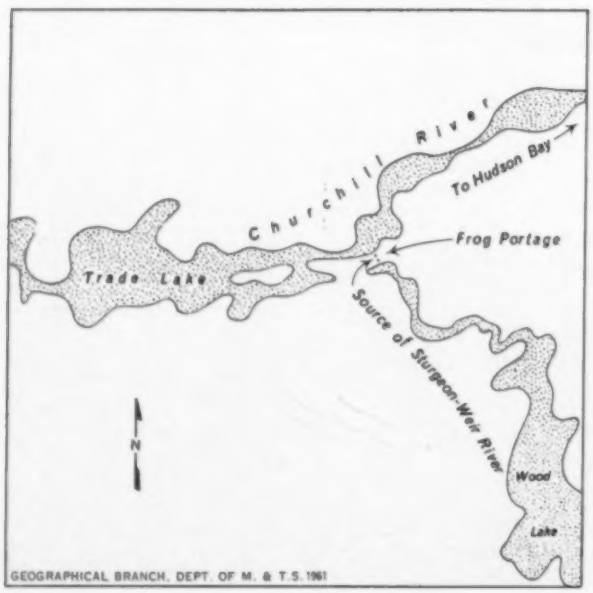
Crossing this divide on the *Kaministikwia* route, used after 1803, was a much tougher proposition. Both the upper Dog River on the St. Lawrence side of the divide, and the source of the Savanne River on the other side, flow through flat, swampy country. The loaded voyageurs often had to cross sections of bog on slippery tree-trunks and sticks laid lengthwise in the muck. So bad was this whole Kaministikwia River route by comparison with the earlier Grand Portage route that the North West Company was forced to pay bonuses to the voyageurs for using it.

Over 1000 miles could now be covered before the voyageurs had to cross another divide, for both the Winnipeg River and the Saskatchewan flowed into the same lake, Winnipeg. Then they had to cross over to the Churchill River at *Frog Portage* (near the Manitoba - Saskatchewan boundary). Frog Portage is flat, easy going, and only about 300 yards long. Past the north end of the portage flows the main stream of the Churchill, through Traite Lake; at the south end is the source of the Sturgeon-Weir River, a





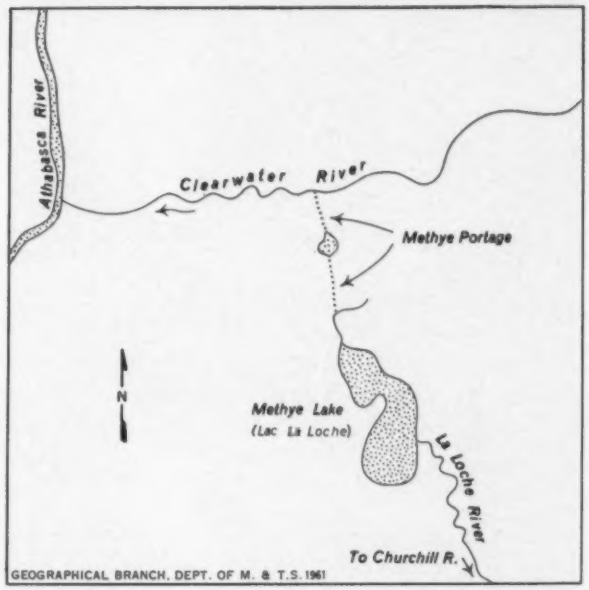
Landing at Frog Portage from the Churchill River. The overflow to the Sturgeon-Weir is through the willows to the right.



tributary of the Saskatchewan. Geographically Frog Portage is a fascinating spot, for the Sturgeon-Weir takes its source in a "water steal", a spill-over from the Churchill. Even at low water in late August there is a substantial flow. In the spring, by three separate, natural spill-ways, the flow of water must be very considerable. The Sturgeon-Weir for its first few miles sits, hardly flows, in a swampy lagoon which corresponds almost exactly in general width to the Churchill in this part. A few miles down, there are pot-holes in the granite, considerably higher than the stream's present level. Everything points plausibly to the Churchill having flowed out by the Sturgeon-Weir during centuries when its present outlet to the north was blocked by the retreating glacier.

Finally on the Voyageurs' Highway was the formidable *Methye* (or La Loche) *Portage*, crossing the sandy ridge separating Hudson Bay waters from the Mackenzie Basin. The portage is about thirteen miles long, but temporary relief can be had by embarking for a mile on a small lake four miles from its

north end. The two challenges facing the voyageurs here were the length of the carry and a fairly sharp drop down to the Clearwater River. Horses and oxen were later used, and there still are extensive "prairies" at both ends, probably once pasture. Dr. Charles Camsell used to speak of wheels of wrecked Red River carts visible along the way. The sandy track through open jack-pine forest was still usable for waggons in 1958. After crossing fairly level ground, for eleven miles, suddenly the land falls away to reveal a dramatic view looking thirty or forty miles down the Clearwater valley; the drop is about 800 feet, and the portage path at the top is steep in spots. The voyageurs were always happy to get this portage past—especially since, whichever way they were heading, the current now would be with them.



Leaving the Voyageurs' Highway, the only other watershed on a main fur-trade artery was on the *Hayes River route* of the Hudson's Bay Company, between Norway House at the north end of Lake Winnipeg and York Factory on Hudson Bay. Actually there is of course a direct water connection between these, the Nelson River. On the face of it, one might wonder why the Company's Orkneymen would want to leave the Nelson and lug their great York boats over a divide to the Hayes.

The little lake just below Frog Portage into which flows a small spill-over from the Churchill River, to start the Sturgeon-Weir River.

The answer is intriguing. In the first place, the Nelson River, though the natural outlet for Lake Winnipeg, is not easily navigable. The 700-foot drop in 400 miles is hardly a steep gradient, but the Nelson, carrying the combined volume of the Saskatchewan, the Assiniboine, the Red, and the Winnipeg Rivers is pretty rough in spots. Flowing through granite with sharp steps and corners, it is not an inviting river to travel, up or down. Flanking it, however, for nearly its whole course, and emptying into the same estuary, is the Hayes, which is relatively small and much more easily navigable for the craft used in the fur trade. The curious

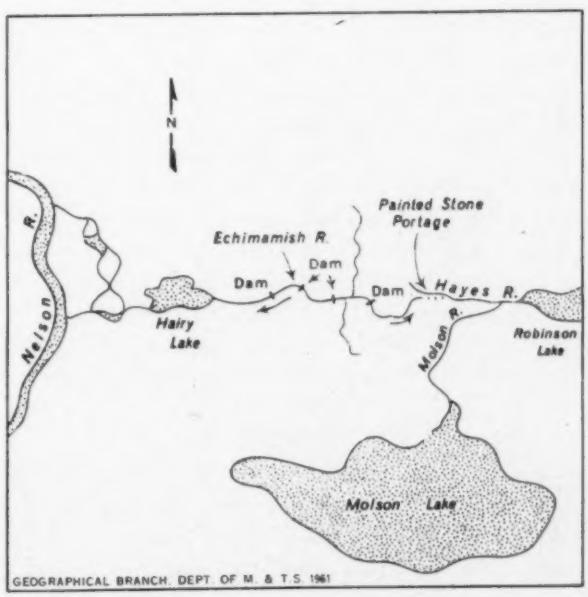
(Left) Methye Portage about half way across—taken in 1958. The old waggon tracks are still faintly traceable. A canoe is disappearing in the background.

(Below) Beaver dam on the La Vase tributary, making this streamlet navigable for the "canots de maitre". Looking north from the upper end of the middle portage.

An old Hudson's Bay Company photograph shows a York boat being hauled over the westernmost (lowest) of the four beaver dams on the Echimamish River. In the foreground are rollers. This picture would have looked no different if taken 150 years ago.

feature which made an option possible was the Echimamish River, meaning the river-that-flows-two-ways. This stream runs across flat, swampy country for a distance of about forty miles. It meanders slowly from due east, and empties into the Nelson about twenty-five miles below Norway House. It is a delightful, sheltered stream to paddle up, with flocks of wild fowl; there is no serious current, and only three obstructions bar one's way, all beaver dams. Each dam is easily portaged around, or the canoe dragged over, and each dam is a slight step up, causing deep water above it. Finally a fourth dam is encountered where, if one is not prepared for it, one might doubt one's senses—for the water is now flowing the opposite way. The key to this conundrum is beaver operating in flat country. They have raised the upper part of the river above its "source", their pond being fed by two side tributaries. When the beaver became temporarily exterminated in the area for their pelts, there is evidence that the Hudson's Bay Company had to build dams at just these spots in order to make the river navigable for the York boats.

But beaver alone would not completely explain how the boats got over the watershed. A few miles above the fourth dam is the



Looking out on Lake Superior from above reconstructed Grand Portage fort, with palisade, bastions, and warehouses. In the background are Grand Portage Island and Hat Point, around which would have come the Montreal canoes to catch their first glimpse of the great fur trade rendezvous.

Painted Stone Portage. Here one merely walks a few steps across a low flat rock from the Echimamish to the Hayes. The evidence would indicate, again as in the case of the Churchill, that in the centuries when the lower Hayes was blocked off by the retreating glacier, the Echimamish had served as a run-off for the upper waters of the Hayes, flushing out the overburden at this point.

Before leaving this context, one might pay tribute to the beaver, which justifiably occupies so prominent a place in our heraldry. Not only did the beaver provide the incentive for exploring Canada, but it alone made many a waterway navigable—particularly over watersheds. A familiar example is the old Indian route between Georgian Bay and Lake Ontario by way of Lake Simcoe. There was not only a close connection between the sources of the Holland and Humber Rivers, but the beaver made their upper waters navigable. The beaver converted many a fast, shallow stream into a canal, a set of stairs. When, as in the case of North Bay, the Echimamish, and the Lake Simcoe cut-off, man killed off the beaver, he had either to make his own dams or portage more steps.

Big Lakes

Finally, in the voyageurs' obstacle race across Canada, were the big lakes—particularly Lakes Winnipeg and Superior. Canoes made of birch rind, without a piece of metal in them, carrying up to three tons of cargo, were particularly vulnerable to big waves breaking their back.

Lake Superior is a sea. When the author in 1960 paddled around its north shore from Fort William to the Soo (in the quietest month, August) it took, for the 425 miles, fifteen days paddling—and eight days of *sitting*, waiting for wind or waves. But let the captain of one of the last birch bark canoes to go around the North Shore speak for himself. Paul Fountain did the trip with three Indians about a hundred years ago. In his *The Great North-West and Great Lake Region of North America* he wrote: "The navigation of these lakes in canoes is a very ticklish business. The canoe is not adapted for navigating rough water; but these lakes, like all large inland bodies of water, are subject to sudden squalls. Unless, therefore, you have time to reach the land, an upset is inevitable. Consequently it is necessary to creep around the shore; but when a bay or inlet is come to, the crew, naturally, to save time and labour, like to strike straight across from headland to headland. In the technical language of the voyageurs this is termed making a traverse. As some of these traverses are not less than twenty miles broad, it is necessary to study the weather, and to be an accurate judge of meteorological probabilities if serious accidents are to be avoided; for the waves of Huron and Superior are not inferior in size

and power to those of the ocean, if, indeed, they are not more to be dreaded. Then, again, there are long stretches on the northern coasts of these lakes where a landing would be impossible, or only possible at the cost of the loss of stores and canoe."

Paul Fountain and most of the early diarists perhaps understandably stressed in their accounts the impressive stretches of Superior where a canoe landing was impossible, without indicating that none of these was more than ten miles long. We found actually that apart from these few dangerous walls there are little spots on an average of every couple of miles where a canoe can land or take shelter. Furthermore, of the 450 miles around the North Shore between the Soo and Grand Portage, some degree of island protection is afforded for about a hundred miles, nearly a quarter of the distance.

The voyageurs coasted around Lake Superior, westward in June and back in August. The North West Company for this particularly perilous part of the journey took out half the cargo from each canoe, leaving it empty at bow and stern and hence less vulnerable to back-breaking waves, and with greater freeboard.

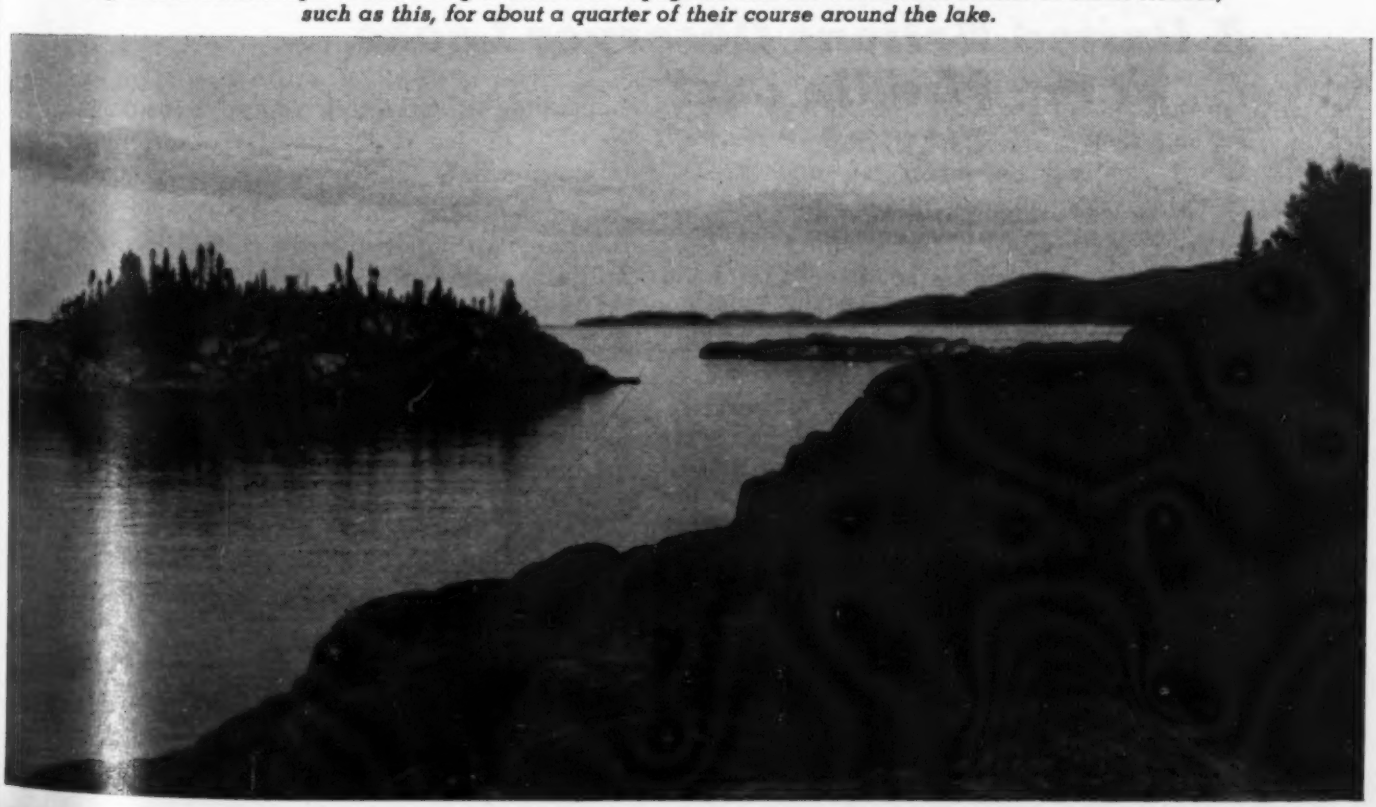
Lake Winnipeg, while much smaller, was just as treacherous. Its shallowness made for very dangerous waves. The last defence the voyageurs had against such big lakes was retreat—to give up, land, and wait. This was termed being "dégradé". They spread out the fur bales to air and dry, and simply relaxed and enjoyed it, waiting for "La Vieille" (as they referred to the wind) to smile on them again.

* * *

Reduced to cold statistics, in the whole 3000 miles of the Voyageurs' Highway between Lachine and Fort Chipewyan there were about 120 portages, 200 "décharges", and over fifty lakes big enough sometimes to halt the fur canoes. But there is more to the story than mere statistics. Wherever a voyageur met his end on the journey—whether by drowning in a rapid, by a strangulated hernia, or by a heart attack—he was buried on the spot, and a crude cross erected over his grave. The early journals speak of seeing as many as eight or ten crosses clustered together. These crosses were nearly all found in certain specific locations, for what claimed this steady toll of sacrificial victims among the voyageurs were the obstacles along the course: the big lakes, the watersheds, and the rapids.

(*The third and final article in this series will appear in the August issue.*)

A scene about half way around Lake Superior's rocky North Shore. It shows the complete lack of shoreline vegetation caused by the lake's big waves. The voyageurs had the occasional shelter of small islands, such as this, for about a quarter of their course around the lake.



The Negev Desert. This scenery is t area to t

A United Nations Observer Looks at the Middle East

by E. W. CUTBILL

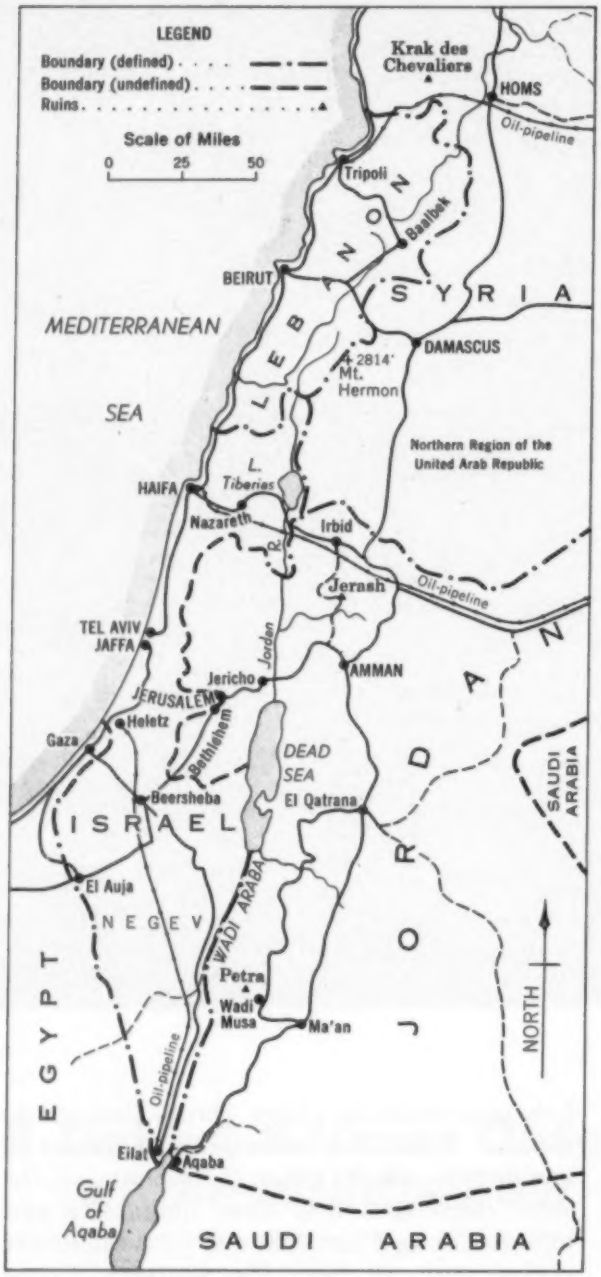
CONFLICT and strife have always been a characteristic of life in the Middle East. Today, an uneasy peace broods over those historic lands that cluster around the eastern end of the Mediterranean Sea — Lebanon, Syria, Israel, and Jordan, with Turkey at the north of this group and Egypt at the south. After the first World War, Palestine was governed by a British mandate until 1948. As soon as the British withdrew, fighting broke out between the Jews and the Arabs, but an armistice agreement was worked out by the United Nations and an uneasy truce has since existed. The United Nations is carrying out an important role in this area and military observers from many countries are manning observation posts, and constantly patrolling border areas. These observers are rotated frequently in the mission area so that they may gain experience. As a result of this, and of opportunities to travel while on leave, members of the United Nations group are able to see a great many places of interest.

Syria, Lebanon, and Israel front onto the Mediterranean. Jordan lies inland and its only port is on a narrow strip of coast along the

ery is t area to the south of the Dead Sea.

Gulf of Aqaba which opens into the north-easterly arm of the Red Sea. The principal geographical feature is the deep incision of the Jordan valley, bordered by hills and mountains, stretching from the foothills of the lofty, windswept Mount Hermon in the north to the Gulf of Aqaba in the south. This deep valley, caused by a rift in the earth's surface, divides the country in two. From its source the Jordan gradually descends to some 650 feet below sea level at Lake Tiberias (the Sea of Galilee), and in its twisting course to the Dead Sea it reaches 1,300 feet below sea level, the lowest spot on earth. South of the Dead Sea, the depression is mainly above sea level and is known as the Wadi el Araba. The coastal plain is wide in the south and covered with sand dunes. It narrows in the north where it is hemmed in by the mountains of Lebanon which in places thrust through to the sea. There is a considerable contrast in terrain; the coastal plain, the mountains, the great depression with more mountains and hills to the east are followed by vast desert plains, and yet from the southern tip of Jordan to the northern border of Syria is only a distance of about 600 miles.

The geography is reflected in the climate. Along the coastal region it is warm and sunny for most of the year but the Jordan valley is hot and humid, particularly in those areas lying below sea level such as historic Jericho. One can swim and sunbathe the year round at the Dead Sea, whose salty waters are extremely buoyant. The deserts are hot in summer and in winter they are cool but sunny, while in the hills the climate is seldom extreme although it can become raw and windy.



Snow is seldom seen except in the mountains, and amongst the higher slopes of Lebanon there is enough snow for good skiing. The rainy season is from November till May; the rest of the year is cloudless and bright.

Flowers grow in profusion the year round where soil and moisture conditions are suitable and in the springtime the wild flowers are beautiful. Along the coastal areas and in sections of the Jordan valley fruit is grown commercially, including bananas, oranges, dates, figs, and lemons. Cactus bushes, olive trees and brilliantly coloured bougainvilleas are to be seen everywhere.

What of the people who live there ? Fundamentally they are much like ourselves but their cultures are quite different in many respects. Also, the Jew is distinct from the Arab and there are contrasts between the cultures of both. The Bedouins, who are the nomads of the desert, can be likened to gypsies. They live in tents and move their location as water, soil and weather conditions dictate, in the same manner as their forefathers did. Their camels and donkeys, sheep and goats, chickens, dogs and sometimes a few head of cattle and horses are an essential part of their life. The lowly donkey and the camel are used for load-carrying. In lieu of tractor and jeep, these animals perform the same tasks, not as efficiently but adequately. Time is of no great importance; what cannot be done today may be completed at some other time. These people seem happy and at home in their environment, but water is a major problem during the long dry season.

The Arab farmers live a more settled life than the Bedouins, but their standard of living is not much higher. Their homes are mud and stone huts, poorly furnished. Kindling wood for fires is difficult to find because large areas of the country are treeless; a kind of thistle bush, gathered by the women provides a substitute. Ploughing is done by wooden implements, drawn by beasts of burden and guided by hand. Women draw water from nearby wells, using "jerry-cans"* or earthenware vessels. It is a colourful sight to see these graceful women in their attractive native costumes discussing the day's affairs while gathered at the local well. Many of them have tattooed faces.

The townsfolk form more closely-knit communities. Automobiles are few and far between except in the larger towns and the people lead a simple and uncomplicated life. The men gather at cafés to chat, smoke their hookahs and play chess or other games. On the streets they either walk or sit astride their

*A general purpose rectangular can with a wide mouth invented by the Germans and adopted by the allied armies for use during World War II. Thousands were used and discarded in the Middle East. *Editor's note.*

A shepherd boy moves his flock of black sheep past a United Nations patrol to the accompaniment of a tune from a flute-like instrument.

donkeys, legs swinging to the animal's gait. The women are almost wholly confined to domestic activities and their religion does not permit much freedom.

The shops are small with open fronts which are shuttered at night by metal drop gates. One can purchase a great variety of goods even in the smaller towns, and all manner of foods are displayed in market places; each purchase is weighed on two-pan scales with metal counters. Craftsmen ply their trade in the open and one can stand by to watch the metal workers, basket weavers, cobblers and tailors busily engaged.

The predominant religion in the Arab countries is the faith of Islam; minarets of mosques dot the sky line of every town and village and at set times of day the call to prayer is delivered from the mosque by the muezzin. Christians are in a minority except in Lebanon. Schools are becoming plentiful and each day the attractive little olive-skinned children, the boys with shaved heads, go laughing and playing on their way to and from school.

The variety of goods offered for sale to the tourist is legion. Amongst the favourite purchases are brass trays, brocades, rugs, jewellery and mosaic inlay work. The trays vary in size from small ones suitable for visiting cards, to massive trays several feet in diameter with deeply-cut, complicated designs. Brocade dress material and damask curtains are made by hand, using methods employed generations ago. Inlaid boxes and tables are painstakingly assembled by craftsmen; each piece of the mosaic is filed to size by hand and glued in place. Labour is cheap and the finished products are sold at very low prices.

Money changers' stalls, where one can exchange currency or buy lottery tickets, are numerous. Although there are many banks, I found that most transactions, including the cashing of cheques, can be carried out more quickly and conveniently by these men.

Life in Israel is quite different in many respects from life in the Arab States. There is, for example, the social and economic unit known as the *kibbutz*, a unique development in which a group of people live, work and

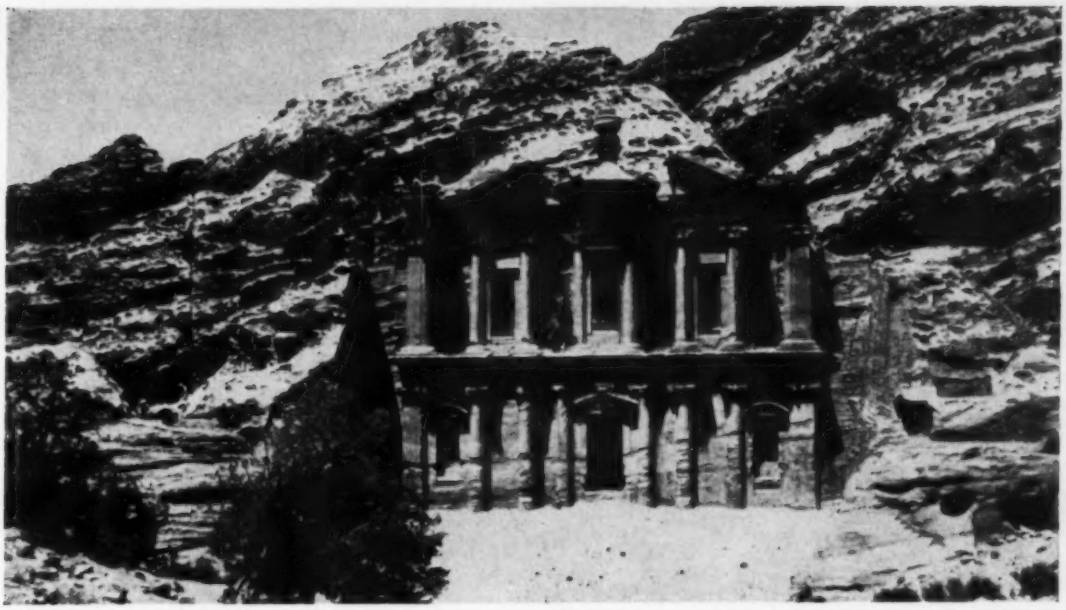
A Nahal or semi-military kibbutz. Note the defences in the foreground.

share a communal existence, the main purpose being to settle and develop the land. To this end there are numerous communities varying in size up to several hundred men, women, and children. Each *kibbutz* has an elected executive committee which plans and organizes the job requirements, finances, building and production aims, recreational and social needs, under general terms laid down by the State. The degree of centralization, control and group participation varies between *kibbutzim* but the general pattern is similar; it is family living on a large scale and everything is shared for the benefit of all. Meals are served in central dining halls, recreation is organized, household and maintenance tasks are done on a roster system. The children are cared for in nurseries or dormitories but may visit their families at certain times daily. Work in the fields, barns, factories and elsewhere is allocated, and both men and women do their quota in jobs where the skill and aptitude of each individual is best suited. The *kibbutz* provides all the necessities of life; it is an interesting experiment in communal living designed to meet the particular needs of the country.

The Israeli farmer, whether a member of a *kibbutz* or not, is making strides in the improvement and cultivation of the land. Reforestation, installation of miles of sprinkler systems for irrigation, rotation of crops and reclamation of rock-strewn or desert land are all features of the rapid progress that is being made, and the use of tractors in farm work is now general.

The Middle East has many antiquities. There are the sacred shrines of Christianity,

A group of children in Lebanon.



The monastery at Petra. This building indicates a strong Graeco-Roman influence in design.

the remains of Roman and Nabatean civilizations, and many more. One of the most unusual sights is Petra, the Rose City, about 180 miles south of Amman, capital of Jordan. Petra was the capital of the Nabateans, an Arab tribe who flourished between the fifth century B.C. and the fifth century A.D. They ruled an area extending as far north as Damascus and, as Petra lay astride one of the chief caravan routes between Syria and Arabia, they charged travellers a fee for safe transit. As a result they became rich and spent their money on the construction of a city carved entirely out of the soft, red sandstone cliffs in the Petra Valley. The best means of access to this valley is by horseback from the police post at Wadi Musa, seven miles distant through a deep, narrow, winding gorge whose walls almost meet far overhead, a position which a handful of men could have held against an army. As a traveller rounds the final bend he sees ahead in brilliant sunshine the building known as the Treasury, carved in the face of the steep hillside. The columns and the elaborately chiselled superstructures are rose-red and beautiful. Beneath it is a huge vault divided into several rooms dug out of the solid rock. Further down the Petra Valley, where it widens out, there are columns whose fine ornamentation has been much defaced by weathering. They guard the entrances to the tombs of the kings, and one can also see dwellings, some of them two and three storeys in height, hewn straight out of the hillside, as well as a monastery and a Justice building. The Nabateans venerated their ancestors, as is apparent from the elaborate carvings for the dead, compared to

Another kibbutz from the outside of a defensive trench. Before the kibbutz was established, this section of land was quite barren of vegetation.

The town of Tiberias looking across Lake Tiberias to Syria.

A young Arab girl picks cotton for an Arab-Jewish cotton-growing co-operative society in Israel.

the simple ones for the living. The sight of this ancient and isolated city stirs our admiration for the skill and love of beauty of the long-forgotten Nabateans who created it.

Early Rome has also left her imprint on the country. A few miles north of Amman are the ruins of Jerash, a city of the Decapolis which was a league of ten free cities who banded themselves together for protection, and of which Damascus is now the only one left of real importance. Jerash reached its peak in the early third century, after which it declined owing to the shifting of trade routes. The city is comparatively well preserved. The now-deserted, stone-cobbled Street of Columns bears grooves of Roman chariot wheels and gaping manholes expose Roman sewers beneath the street. Columns,

ruined temples, and dwellings stand side by side for a distance of about half a mile. The street opens upon a large circular forum, partially surrounded by pillars, which was the town market and meeting place. The nearby Great Theatre with its tier upon tier of stone seats still stands, the stage bare under a cloudless sky. Lizards and scorpions are the only occupants.

Scattered throughout the Holy Land are the remains of castles built by the Crusaders between 1099 and 1187. Strategically sited both near the coast and inland, these fortresses served as rallying points for defence and counter-attack and also as administrative headquarters for surrounding areas. Their strength and careful siting enabled the country to be held by a minimum of troops. The largest and best preserved of these castles is the famous Krak des Chevaliers in Syria not far from the sea coast. It took some seventy years to build and its towering walls are visible from afar. At its peak period it held a garrison of about 2,000 men, and was built with two walls of defence, the inner one on higher ground commanding the outer. Here we find all the trappings of a mediaeval fortress complete with moats, drawbridges, portcullises, sloping taluses, linked towers, and firing slits. Within are vast banqueting halls, galleries, a dungeon, a chapel, and rows of stone stables hundreds of yards in length. Viaducts carried water to cisterns eighty feet deep. There are oil presses and storage vats in which the oil could be heated and poured down upon the heads of attackers. On the roof of the inner circle is a stone table, forty feet across, around which the knights could eat during good weather. The view from here is uninterrupted.

By contrast, the big, new, bustling city of Tel Aviv on the coast of Israel, a city which is expanding rapidly with modern apartment blocks, painted in pastel shades, office buildings and factories, brings one back to the twentieth century abruptly. Sidewalk cafés line the busy streets, boulevards and waterfront; bars, theatres and restaurants are crowded. Further up the coast in sunny Lebanon is the city of Beirut, famous since the days of the Phoenicians, and now thriving in business, trade and tourism, a fascinating mixture of the Arab and the Western world, and like Tel Aviv, enjoying the prosperity derived from Mediterranean trade.

To a Christian, the holiest of all cities is Jerusalem, now divided into two parts with Israel holding the new section while the old walled city belongs to Jordan. A No-Man's-Land separates the two parts and passage between them is restricted. On Good Friday I followed the procession along the Way of the Cross, which is the path that Our Lord followed. The crowd gathered at the site of

London Square, Tel Aviv, exemplifies the modern aspect of Israel.

A street scene at Acre, a town on the Mediterranean coast just north of Haifa. Acre is one of the main centres of Arab population in Israel.

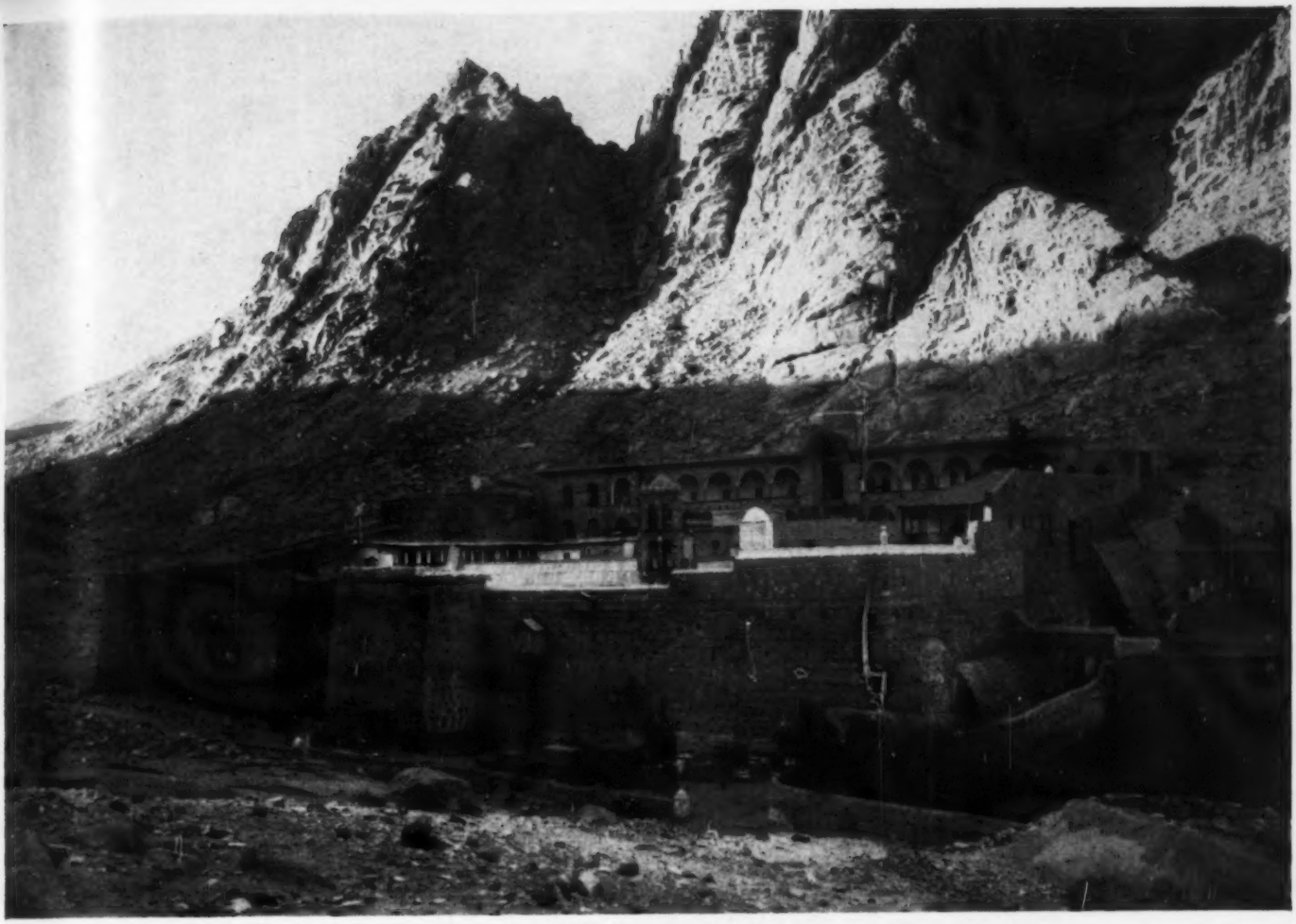
Centre:—The Via Dolorosa in Jerusalem.

Pontius Pilate's Praetorium in the old city at the first Station of the Cross. Each Christian sect carried a cross of its own and many of the pilgrims were dressed in the costume of His time. The procession moved slowly and reverently along the route, stopping for a prayer at each of the Stations, and passed along Via Dolorosa, a narrow cobbled street flanked by stone houses whose upper dormer windows almost meet overhead. The procession ended at Calvary, where the final Stations of the Cross were observed in the Church of the Holy Sepulchre, the most sacred spot in Christendom where Jesus was entombed.

On Easter Sunday the ceremony of the Holy Fire, symbolizing the Resurrection, took place at the Holy Sepulchre. The rotunda around the tomb was crowded as was the courtyard outside the Church and the neighbouring windows and roof tops. The Holy Fire, believed to come straight from Heaven to the Tomb, suddenly leapt from the small entrance way. This was the signal for the lighting of tapers from the flame. The rejoicing crowd now squeezed itself out of the Church, singing and crying, as lighted tapers passed from hand to hand. Bells rang, scarcely audible above the din of the happy cheering throngs.

Outside the city walls just beyond the Valley of Kedron, stands the dazzling white limestone Mount of Olives. At its base is the Church of all Nations, or Basilica of the Agony, built on the site of the agony and prayer of Jesus. The facade of the Church is a coloured mosaic depicting the Saviour offering up to God the sufferings of the world. Beside the Church is the attractive Garden of Gethsemane, containing eight ancient olive trees bent low with age. From here can be seen the Dome of the Rock with its massive gold cupola and octagonal-shaped mosaic sides. This is one of the most beautiful

The Dome of the Rock, Jerusalem, one of the most beautiful buildings in the world, was built by the caliph 'Abd el-Melek in A.D. 691.

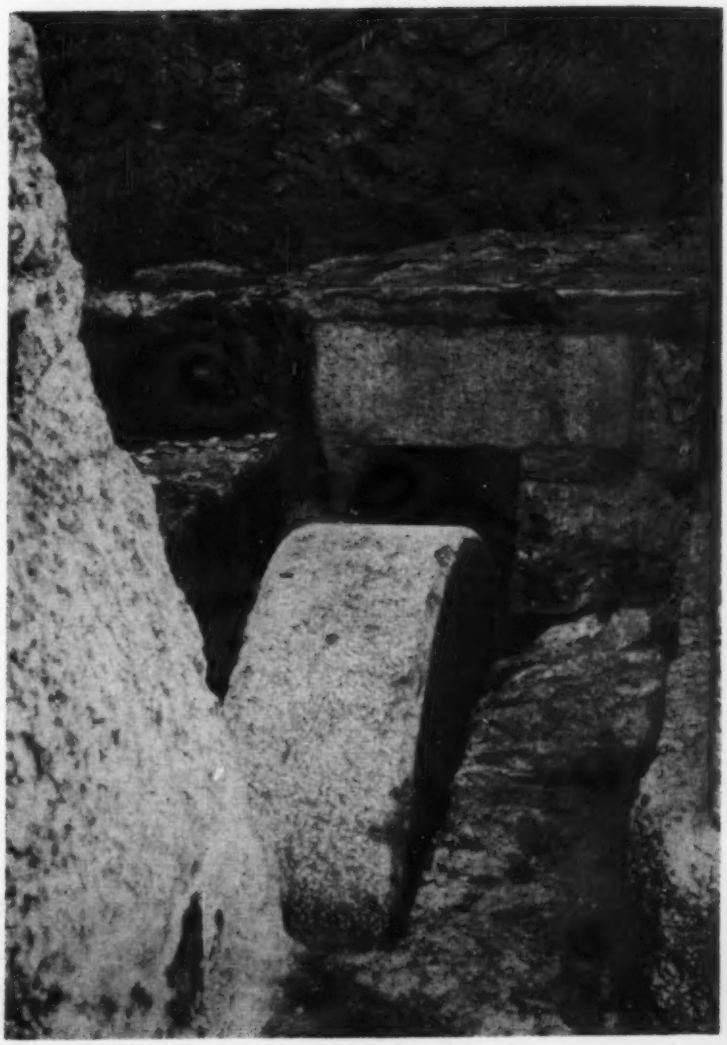


The monastery of St. Catherine in Mount Sinai, built originally by the Byzantine emperor Justinian I (A.D. 483-565). The Crusaders occupied it for about twenty years. This monastery is one of many places visited by United Nations personnel.

and unusual buildings in the world. The rock itself, which is venerated by Christians and Moslems alike, lies beneath the Dome.

These lands which I have so briefly discussed are the birthplaces of two of the world's principal religions, Christianity and Mohammedanism (the Faith of Islam). Still little changed through the centuries, they, and their people offer a fascinating study to the visitor from abroad.

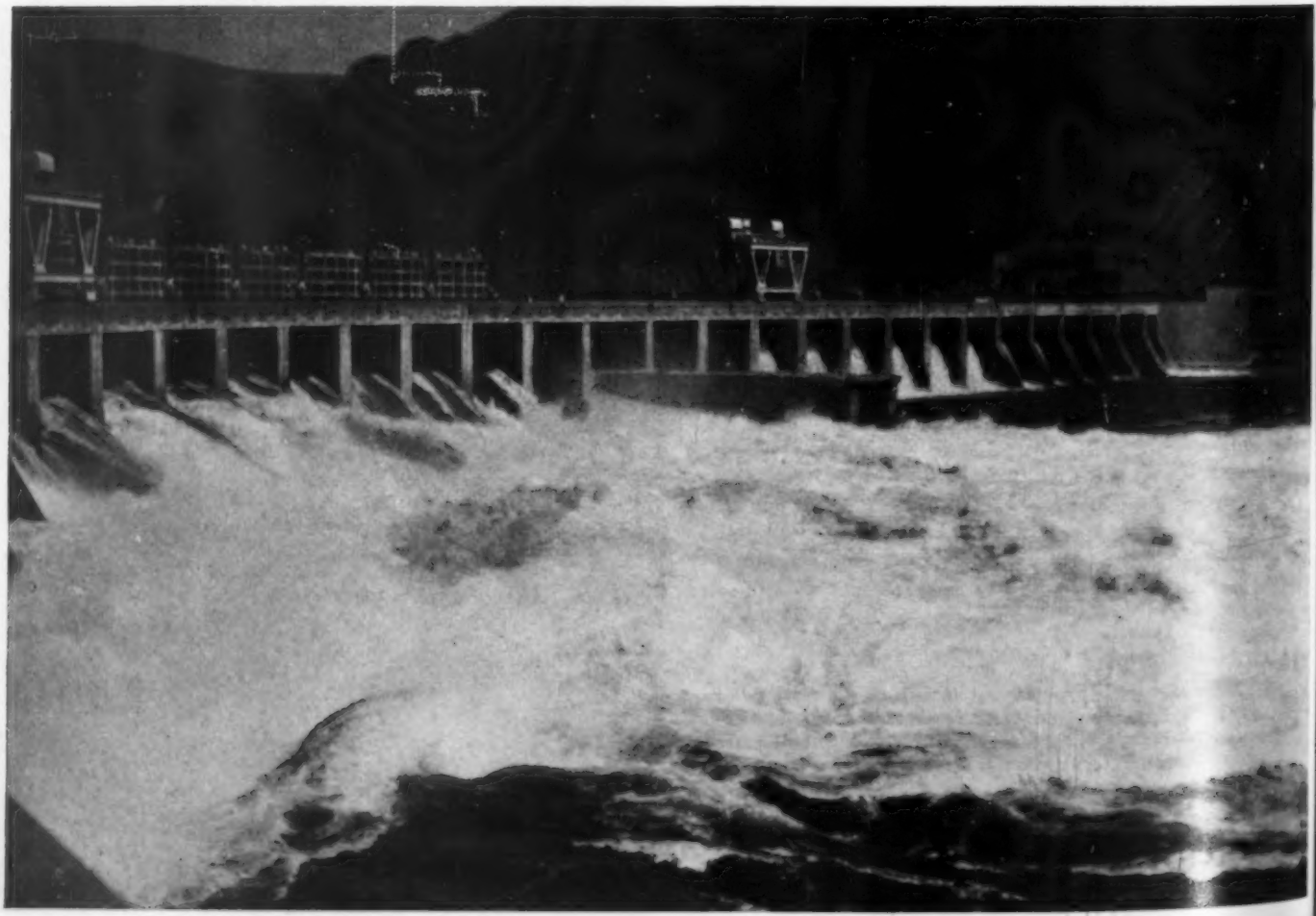
Grateful acknowledgment is made to the following for photographs used to illustrate this article: the author, Roger Bird, Dr. R. O. MacFarlane, Directorate of Military Intelligence (Canada), State of Israel.



The family tomb of Herod in Jerusalem dates from the first century A.D. and consists of six burial chambers cut out of solid rock. Note the massive circular stone used to seal the entrance.

Floods can cause log jams which obstruct migration of salmon and change spawning beds.

Hydro-electric dams cause losses and delays in both upstream and downstream migrating fish.



Man-made Spawning Channels for Pacific Salmon

by DIXON MacKINNON

Photographs by the Department of Fisheries, Canada.

A MAN-MADE salmon spawning channel has just been completed at Robertson Creek on the Somass River System near Port Alberni, British Columbia. This channel, artificial in every respect, was designed and constructed by engineers and biologists of the Fisheries Department of Canada to provide the best conditions known for spawning Pacific salmon and incubating their progeny. Man, by altering the geography of British Columbia during the early exploitation of its resources, has added many hazards to the life of the salmon. This channel, also a geographical change, presents a new and promising approach toward removing some of these hazards. Although the perils in the salmon's life from egg to spawning adult are many, by far the greatest mortality occurs during the egg and larval stages in the gravel of the stream bed. In British Columbia and Alaska studies on three of the five species of Pacific salmon have shown that less than 10 percent of their eggs live to hatch and become free swimming fry. It is assumed that similar losses occur in the other two of the five species.

British Columbia's five species of Pacific salmon are not to be confused with the Atlantic salmon of the Eastern Seaboard from which they derived their name. The Atlantic salmon is actually more closely related to the various Pacific trout such as steelhead, cutthroat, and Kamloops. To add to the confusion each of the five Pacific species has several common names. However, as a result of an effort on the part of the fishermen, canners, anglers, and biologists a single popular name for each has been fairly well established. These five popular names with their proper or scientific names following are: sockeye (*nerka*), pink (*gorbuscha*), chum (*keta*), coho (*kisutch*), and spring (*tschawytscha*). All are commercially valuable and the last two provide an increasingly important sport fishery.

These five species of salmon differ considerably in size, in habit, in age at maturity, in length of the period spent in fresh and salt water and in the time of return to fresh water. There are, however, many important similarities in their life histories. They all spend the major portion of their life in salt water and when sexually mature, move into fresh water, stop feeding, change shape and colour and ascend the stream of their birth just as their parents did before them. Once in their "home stream" they deposit their eggs deep in the gravel—a new cycle started, they die.

Deep in the gravel of the stream-bed is probably Nature's safest sanctuary for these developing eggs. They are presumably safe from predation, extremes of temperature, securely lodged against increased surface flow and deep enough to withstand reduced winter flows. Yet 90 percent of them die.

Has this great loss of potential always existed ? Were the legendary runs of less than a century ago produced by 10 percent of the potential of these salmon ? " I can remember when you could walk across this stream on the

Logging and road-building in watershed area alters normal flow patterns, increases erosion and siltation of spawning beds.

backs of spawning salmon" is a common statement from pioneers who have spent their youth along the banks of many of our now unproductive salmon streams. There is no question that these statements are true in the figurative sense. In some streams in some years this still holds true yet hundreds of our rivers, streams and tributaries have only small fractions of their former spawning stocks which, if still present, would be worth many millions of dollars annually.

What has happened to this uncultivated resource that everyone thought would never end? The answer to this question is not simple. Many geographic changes have occurred in a short time with which these delicately balanced animals could not cope. A century ago, before civilization had made its rapid inroads, all of our watersheds were heavily forested, streams were shaded, temperatures and run-off were controlled within a relatively narrow and consistent range. The only serious predators on adult salmon were bears, birds and scattered tribes of Indians. Stocks were balanced at high levels—enough to "swamp" the intermittent predators of young salmon in fresh water and of maturing salmon in the ocean. This situation of a century ago was probably very little changed over many previous centuries. During this length of time stocks of fish adapted to specific streams. Those fish with inherent tolerance to a specific range of environmental characteristics survived to produce progeny which, in turn, inherited a gradually increasing tolerance for this specific environment. As a result of this selection and gradual change the races of salmon became closely adapted to their particular environment—still able to make evolutionary adjustments but not able to cope with extreme changes created by man in the short space of one century.

Gravel beds where fish spawn at high water are often left high and dry when the water recedes.

Deforestation, impoundments for hydroelectric power and other uses, diversion of water for irrigation and domestic use and pollution were the major detrimental effects introduced by the advance of civilization. While all of these factors have had an adverse effect on salmon, deforestation has probably been the most severe and widespread in British Columbia. Removal of forest cover causes rapid changes in flow patterns. Flash floods, with their destructive scouring of stream-beds are followed by low flows during dry weather. Severe erosion of stream banks occurs to cover up the salmon redds or impede the proper percolation of water through the gravel of the stream-bed. Stream water temperatures rise during summer low flow periods affecting fish that are migrating or waiting to spawn.

Simultaneously, increased human populations led to increased fishing pressures. Very little was known of the complexities of salmon runs in the early history of the fishery, nor were government agencies organized properly to protect and manage them. Unequal fishing pressures resulted in the virtual extinction of some runs. As one run became depleted fishermen moved on to the next stream mouth in search of the most available source of fish. As a result of this unplanned exploitation many long sections of coastline are characterized by

Irrigation ditches, now screened, once caused the loss of many young salmon.

great voids in the natural distribution of the five species. Many of these streams now have only the vestiges of runs that cannot recover without help from reduced fishing pressure, improved conditions for survival, or a combination of both these aids.

Biological research began with long, difficult studies of the life history of the five species of salmon. One line of research pointed out the percent mortalities at each stage of the life cycle and then went on to classify the various factors that were responsible for these losses. It soon became evident that the greatest losses occurred in the egg and larval stages and that these losses were common to all species. Hope was restored by this information for at this stage of life the salmon can be reached and studied. They can be provided for if their needs are known. The possibilities for help at this time are many times greater than in later stages when they have vanished in the lakes or ocean.

Investigations into the requirements for developing eggs and alevins were carried out and, in logical sequence, critical measurements of the various features of the spawning streams were made. It became increasingly obvious that three major factors were operating against salmon eggs in most of the streams studied:

1. *Extreme ranges in stream flow.* Floods, which occur after the salmon eggs have been deposited in the gravel often erode streambeds enough to uncover developing eggs and newly hatched alevins. Similarly, mid-winter low flows often expose excellent spawning beds and their incubating eggs to freezing and dessication. If these low flows persist into spring millions of young fry are stranded in side pools with no access to the lakes or sea.

2. *Silting of spawning beds.* Many spawning beds that were once clear are now covered with heavy layers of silt. In an unspoiled watershed some silt settles out on the spawning grounds. Large runs of fish, by digging their nests, can effectively clean the whole spawning area. However, in recent years logging, road building, and other activities have broken the vegetation, increased erosion and greatly accelerated silt deposition. This, coupled with reduced numbers of spawning fish, results in inevitable deterioration of salmon streams. These heavy layers of silt reduce the rate of interchange between surface and subterranean water with a subsequent lowering of the amount of dissolved oxygen available to incubating eggs.

3. *Lack of adequate flow through the gravel.* The supply of dissolved oxygen to developing eggs depends upon the percolation of subterranean flow through the spawning beds. Biologists and engineers developed instruments to measure the percolation rate and dissolved oxygen content of subterranean water flowing through stream-bed gravel. These measurements when related to measurements of survival demonstrated that mortality was caused by low oxygen levels asso-

ciated with low percolation rates. Many of our stream gravels were found to be so compacted and non-porous that they are no longer able to maintain the high oxygen levels so critical for survival of developing salmon eggs.

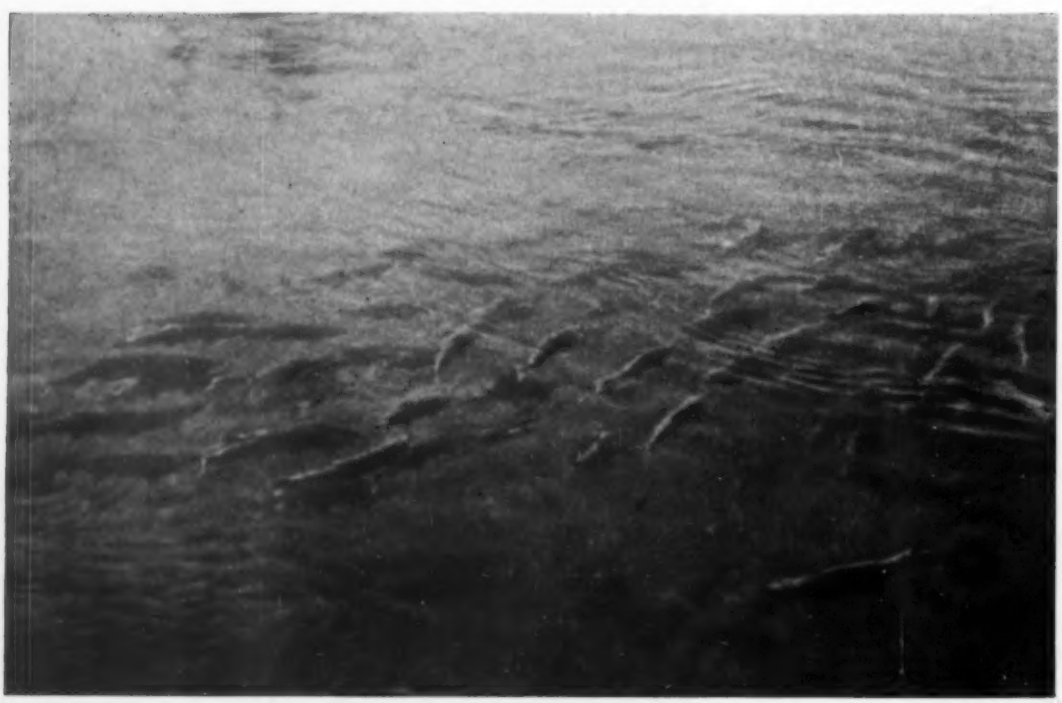
It is quite evident that if these major physical factors are controlled and optimum conditions are provided a greater production of young fish would result.

The first opportunity to put this thought into practice came when the British Columbia Electric Company announced plans for a high-head hydro-electric project on Jones Creek near Hope, B.C. This is a small stream frequented primarily by pink salmon only in the odd-numbered years. The proposed project if allowed to proceed would eliminate the Jones Creek salmon and if sufficient flow were provided to maintain the salmon the project would be uneconomical. A mutually satisfactory agreement was reached between the power company and the Department of Fisheries of Canada when the company agreed to build a spawning channel which, through efficient use, would require relatively little water.

To provide the company with the best possible specifications biologists and engineers investigated all available sources of information. This information was supplemented by sampling stream gravels, checking stream gradients and measuring the depths and velocities of water preferred by spawning salmon. The spawning channel, cut through timber-covered land alongside the old stream-bed, has a surface width of 14 feet and length of 2,000 feet. Low weirs were constructed every one hundred feet of channel length to remove the 16 feet of excess grade in the channel and control depth within a range of from one to two feet and velocity within a range of from one to two and one-half feet per second. Graded gravel ranging in size from one quarter to one and one-half inches was laid to a depth of 12 to 18 inches throughout the channel. A valve-controlled inlet was installed to allow the required 20 cubic feet per second to flow over the spawning channel and to by-pass excess flows over the old stream-bed. A fish diversion weir was constructed to direct salmon into the channel and prevent them from entering the now extremely undependable original stream.

The first fish spawned in this channel in 1955 despite the fact that it was completely artificial. The eggs remained in the loose clean gravel through the winter, constantly covered by a foot of gently flowing water. The following spring the progeny of these pink salmon were trapped and counted as they migrated into the Fraser River on their way to the ocean. Thirty-eight percent of the eggs survived to migrate seaward as fry—a four-fold increase over natural stream survival and a record for naturally deposited eggs.

Pink salmon with their short life cycle are



Adult salmon migrating upstream toward their spawning ground.

Jones Creek, the first artificial salmon spawning-channel to be built.

excellent experimental animals since information dependent upon measurement of a second generation can be gathered in two years. In 1957, 1,500 adults returned to this channel—a threefold increase over the parent year. The eggs deposited by these adults again achieved a survival of 38 percent. By the summer of 1959 samples of the gravel showed that a large amount of silt had been accumulated and the gravel was now considered to have deteriorated to the point where it was no better than that found in natural streams. The British Columbia Electric Company, who had agreed to maintain this channel, removed, screened and replaced all the gravel, adding new gravel to make up for the discarded fine material. When the adult salmon returned in 1959 the bed of the channel was covered by a one-foot layer of loose porous gravel. Approximately 3,000 fish returned and spawned in the improved channel and a count of fry emigrating seaward the following spring showed a phenomenal 63 percent survival. Thus with two years of good egg-to-fry survival the pink salmon run has increased from 400 to 3,000 fish and there is no reason to doubt that the 1961 run will tax the capacity of the channel.

While this is evidence of successful improvement of a natural salmon run the Jones Creek channel also provided encouraging results in introducing new runs. The Fraser River sys-

Trap at mouth of Jones Creek channel allows fry counts to be made and survival assessed.

tem has what is called "on" and "off" years for pink salmon. That is, while the commercial fishery in the Fraser River may take as many as 10 million pink salmon in the odd-numbered years, less than a thousand are taken in the even-numbered years. The idea that these barren or blank years may be made as productive as the "on" years has long been a source of speculation. Fisheries Research Board biologists took the first step in exploring this possibility by transplanting nearly 3 million pink eggs from the Skeena River system into Jones Creek in 1954. Sampling of the fry migration the following spring showed that 1.1 million fry left the channel for the ocean. Percentage egg-to-fry survival based on the number of eggs originally taken from the fish was 37 percent.

The fact that these eggs had been taken from a tributary of the Skeena River and planted in a stream that was 500 miles south, historically barren and artificial in every respect, provided an extreme test for this translocation method of establishing a salmon run. In addition, this relatively small number of fry would have to withstand the hazards of 90 miles of the Fraser River, spend 16 months in a strange part of the ocean unbuffered from predation by the millions of fry that would normally be present in an "on" year, then again find the Fraser River and finally enter the 12-foot channel that produced them. With all these odds it was considered remarkable when, in the fall of 1956, nearly 3,000 pink salmon spawned in the Jones Creek channel. This was the first recorded "off"-year pink salmon run in the history of the Fraser River watershed. It was further estimated that an additional 6,000 Jones Creek salmon were taken by fishermen in the Johnstone Strait and Fraser River commercial fishery.

This experiment actually ended with these results. The second generation of this introduced run suffered a high mortality when ice broke the dyked banks of the channel. An intensive sockeye fishery at the time the returning adults were migrating through the Fraser River fishing area in 1958 was considered to have further reduced this run. An important step had been made and much had been learned that would improve the chance of success of future projects of this nature.

It was not surprising that the next spawning channel was built on the Columbia River in the United States. The Columbia, one of the world's most productive salmon rivers,

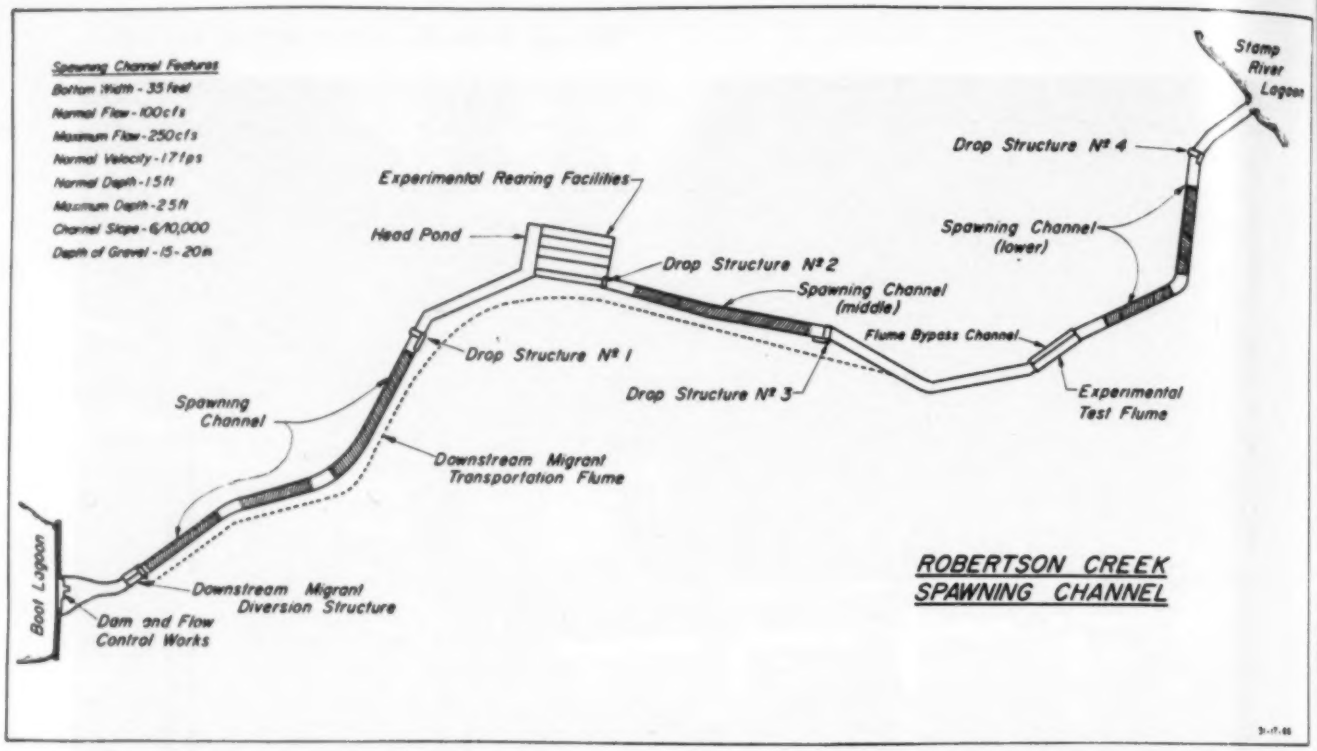
Pink salmon are seined in their spawning ground to provide eggs for transplanting into an artificial spawning channel.

Trapping, holding, and sorting facilities are needed to assist egg-taking for large-scale transplants.

has now become a series of reservoirs and major dams. Ten mainstem dams are now either constructed or being constructed. Power development and land reclamation has reached an extremely high degree in this area. A total of 57 major dams and impoundments has been built and 19 more are planned for this watershed. State and Federal fisheries agencies and private and public power agencies, aware of the losses associated with this rapidly changed environment, are looking to every method to salvage the present reduced salmon stocks. In 1957 the U.S. Army Corps of Engineers constructed the McNary artificial spawning channel on the Oregon shore of the Columbia River immediately below McNary dam. The channel, operated by the Washington State Department of Fisheries, is investigating the production of spring salmon in artificially created areas.

A different approach to artificial spawning areas was taken by the International Pacific Salmon Fisheries Commission at Horsefly Lake in south-central British Columbia. Ponds were constructed with gravel laid over perforated pipes. Water, pumped from the lake into the pipes, upwelled through the gravel at calculated rates. Sockeye salmon eggs which were both planted and naturally deposited in these ponds showed high survivals ranging between 20 and 68 percent. This type of spawning area appears to have its greatest use with lake spawning sockeye and has already been adopted for use at Baker Lake in Washington State as a substitute for natural lake spawning areas inundated by the construction of a hydro-electric dam.

Artificial spawning areas built to solve problems created by power development have not only been useful in their original objective but also have provided information and encouragement that appears to be opening a whole new field of fish culture. The Department of Fisheries of Canada, realizing the potential of this method when applied to development of the fishery, has just completed construction of the largest and most up-to-date spawning channel in existence.



Many features were built into the channel to create and vary several environmental conditions. In this way additional information can be obtained on the ideal requirements for increasing stocks of salmon.

This Robertson Creek channel, referred to in the introductory paragraph of this article, is unique from all others either in existence or in the planning stage. It was built solely by public funds and is therefore not restricted to specific objectives created by fish-power problems. Although many of these problems will be attacked by use of the flexible experimental facilities built into this project, the primary aim is to produce salmon and at the same time learn how to produce even more salmon.

The water for this channel is taken in a desired quantity from a secondary outlet of Great Central Lake by use of a dam and a valve-controlled inlet pipe. This clear unsilted lake water passes through a screening device which by-passes any unwanted fish around

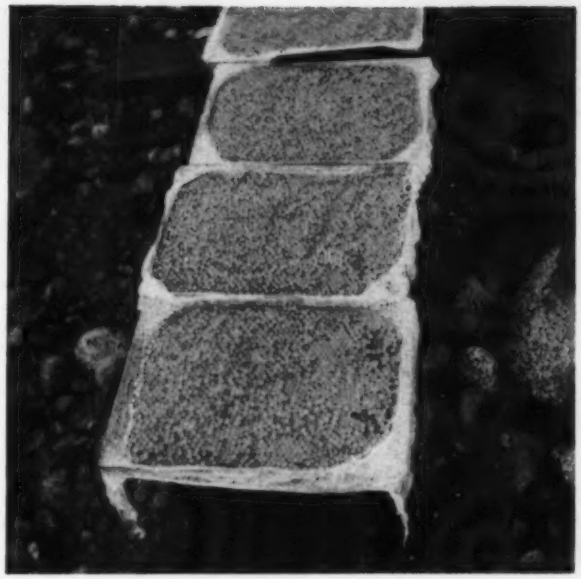
Eggs taken from the female are fertilized with milt from the male.

Dead eggs are removed before planting to reduce mortality from fungus.

the experimental sections of the stream. Free from fish and silt the water moves downstream, at a depth and velocity controlled by special downstream gates, over gravel which has been carefully screened to specifications known to provide excellent porosity and stability. This water passes over a total of 8,000 square yards of spawning bed in the 2,500 feet of the channel that has been developed as spawning stream. It then flows into the Stamp River which enters the Pacific Ocean by way of the Somass River situated on the west coast of Vancouver Island. Upstream migrating adult salmon can be trapped at the mouth of the channel, sorted for species and by use of a brail and hoist system, can be transported by tank truck to any desired section of the channel.

The first experiment in the channel dramatically illustrated that the conditions provided were ideal for salmon incubation. Fisheries Department biologists took 1,746,109 eggs from pink salmon spawning in abundance in the Indian River near Vancouver. With the objective of introducing pink salmon into the Stamp River, historically barren of this species, these eggs were planted in the Robertson Creek channel. They developed over the winter, hatched and emerged as fry in the spring. On their way to sea these fry were intercepted, counted and released. A count of 1,558,969 fry was recorded—a survival of 91 percent.

Though the spawning stream was completely artificial it was no more artificial than the actual spawning act. As these fish were ready to spawn and die in their native stream they were netted, killed and stripped of their eggs and sperm. The eggs were fertilized in small lots in a wash-basin, then rinsed and allowed to harden in water. They were then transported to a conventional hatchery where they developed for six to eight weeks. By this time the eyes of the embryo could be seen as black spots in the egg. These "eyed eggs", having passed the sensitive stage and being able to withstand considerable mechanical shock, were moved to Robertson Creek and planted.



Top: Salmon eggs are kept cool and damp for transportation.

Middle: Eggs planted in furrows are gently covered with gravel.

Bottom: Eggs must be carefully floated into the gravel.

Robertson Creek Channel under construction. Note the invert control to stabilize gravel and concrete drop structure to provide required gradient, depth, and velocity.

A completed section of the Robertson Creek channel before the water was turned on, showing spawning gravel and a resting pool for salmon waiting to spawn.

Drop structures fitted with sector gates remove the excess grade from the channel and allow upstream depth and velocity to be varied in each spawning section.

Trenches were dug bank to bank across the stream-bed and the eggs were carefully deposited and covered with gravel. Planted at a density of 4,000 eggs per lineal yard of trench with trenches three feet apart a seeding density of 4,000 eggs per square yard of stream-bed was achieved. This is twice the maximum density accomplished by naturally-spawning fish. Thus with twice as efficient use of space and a ninefold increase over natural survival it appears that the Robertson Creek channel has demonstrated a production rate near the maximum level.

The Canadian successes at Jones Creek and Robertson Creek have stimulated fisheries and power agencies in the western United States. Supplementary channels are being considered at not less than four major hydro-electric dams on the Columbia and Snake Rivers. The second spawning channel in the United States has just been completed on the upper McKenzie River near Eugene, Oregon in connection with the Carmen Smith Hydro-electric Project. Several proposals in this field are being studied in California where multiple use of the salmon waters of the Sacramento-San Joaquin River system is now essential. In addition, many small streams in Washington and northern Idaho are being improved by the addition of gravel and the construction of gravel stabilizing check dams.

It should be emphasized that the artificial spawning stream is not the panacea for solving all fisheries problems associated with hydro-electric developments nor is it guaranteed to fill all streams with optimum numbers of all species of salmon. It is known, for instance, that sockeye production is chiefly limited by lake capacity and coho production by stream capacity. Help to these species can only be given when, through lack of fry, these capacities are not fully utilized. Conditions affecting post-fry stages may be such that gains in the pre-fry stage will be nullified. Complexities of races, distribution, and fishing pressures will undoubtedly cause setbacks in such programs. Most complex of all—the animal itself, cold-blooded with a relatively simple nervous system, it is at the mercy of small, unmeasureable and possibly yet unknown differences in its variety of environments. Precise definition of these elements, though difficult and time consuming, is being sought with high priority by government research groups.

In the meantime control of the gross physical characteristics at the Robertson Creek channel has, in 400 square yards of gravel, produced a number of fry equivalent to that which has returned many thousands of adult salmon under natural conditions in other localities.

Though caution and pessimism are well-established characteristics in the field of fisheries, the characteristics of imagination and speculation are also present. Theoretically the total multi-million dollar crops of pink and chum salmon in British Columbia can be produced in 1,000 acres, an area equivalent to that of Stanley Park in the City of Vancouver. The possible future goal of these early experiments is a form of semi-cultivation where the physical needs of these species can be provided during their short stay in fresh water. Once hatched these tiny fry migrate to the rich pasture of the ocean and after a short stay return as several pounds of protein.

A vision such as this is brought to reality by the knowledge that controlling flows and building spawning channels is extremely expensive. However, these large expenditures may soon become practical, for what better way is there to harvest the much talked-about plankton crop of the ocean ?

Pink salmon fry emerge from the gravel and migrate toward the ocean.

EDITOR'S NOTE-BOOK

Eric W. Morse (*Voyageurs' Highway*), see biographical sketch in C.G.J. for May 1961.

* * *

Lieutenant-Colonel E. W. Cutbill (*A United Nations Observer Looks At The Middle East*) has recently returned from service as a United Nations military observer in the Middle East. He was born in the town of Niagara Falls, Ontario, and was educated both in Canada and in England. He holds a degree in Political Science from Carleton University in Ottawa in addition to numerous military qualifications. Service during World War II took him to the United Kingdom, North Africa, Sicily, Italy, and northwest Europe. His post-war appointments have included, among others, Canadian Military Attaché at Warsaw, Poland; Commanding Officer of the Army Summer School at the Royal Military College, Kingston, Ontario; and executive officer in the Army Historical Section at Ottawa. Now retired, Lt.-Col. Cutbill is now Executive Secretary of the Northwestern Branch of the Toronto Y.M.C.A.

* * *

Dixon MacKinnon (*Man-made Spawning Channels for Pacific Salmon*) is a Senior Biologist with the Fish Culture Development Branch of the Department of Fisheries in Vancouver. He obtained his B.A. in zoology in 1949 and his M.A. in 1951, both from the University of British Columbia. From 1950 to 1957, he worked on a variety of research projects with the Fisheries Research Board of Canada at their Nanaimo Biological Station. In 1957, he left the Fisheries Research Board to assume his present position. His work and interests throughout this period have been closely associated with the conservation of Pacific salmon. Recently, he has been able to see successful application of some of the principles he has helped explore through the development of man-made spawning channels.

AMONGST THE NEW BOOKS

The Human Use of the Earth
by Philip L. Wagner

(The Free Press of Glencoe, Illinois. 270 pp. $6.00)

Interactions involving living organisms are no less real than those of Newtonian dynamics. The operative difference is that the latter have been studied longer and more systematically. Human geography is based on a complex of interactions. How man moulds his physical environment, which in its turn modifies him forms an interesting subject, and Philip Wagner's book ranges widely through it. The threads of ecology, history, technology, sociology, and of course geography, are woven into an intricate tapestry. Some characteristics of the weave may be gathered from this partial list of chapter headings: Conditions of Human Life; Man's Place in the World; Human Societies as Geographic Forms; The Economic Bond; The Means of Production; Artificial Environments; Ways of Livelihood. The notes and documentation at the end of the book are unusually comprehensive.

The non-specialist reader in human geography is occasionally led to won-

(*Continued on page VII*)

Courtesy of Canadian Government Travel Bureau

Not many of you may be able this year to travel as far afield as Waterton Lakes National Park in Alberta but we have brought other beautiful and historic spots in Canada to your attention during the year and hope that through the medium of the *Canadian Geographical Journal* we may have succeeded in adding interest to your vacation. There are corners in all parts of all the provinces that are well worth a visit. Those you cannot see in person we hope we will be able to present to you over the years in words and pictures. Meanwhile may we wish you a Happy Holiday!

The August issue will take you even farther afield since it includes the first of two articles by J. R. Lotz about the life and activities of the Canadian scientists who worked on Ellesmere Island during the International Geophysical Year.

Information and Enquiries About Membership

Members are invited to nominate for membership any of their friends who might be interested in joining the Society. We will send them further information about the Society and about the *Canadian Geographical Journal.*

Non-members are invited to apply for membership or for further information. We would welcome you into the Society.

Please copy, or fill out, the form below and send it to us. We will act accordingly.

To:— The Executive Secretary
The Royal Canadian Geographical Society
54 Park Avenue, Ottawa 4, Ontario

Check here

For Members
I nominate for membership in the Society the person named below. Please send him/her information about the Society and about the *Canadian Geographical Journal.* ☐

For Non-Members
I want to become a member of the Society, and to receive the *Canadian Geographical Journal* monthly. I enclose annual dues of five dollars ($5.00). ☐

I desire further information about the Society and about the *Canadian Geographical Journal.* ☐

Member's Name.....
.....
street
.....
city, zone, province

Candidate's Name.....
.....
street
.....
city, zone, province

Annual Membership fees of $5.00 for European and sterling area members are payable in sterling, 36/-, to the Society's European Representative:

W. H. Corkill
The Mead, West Dumpton Lane,
Ramsgate, England

United States residents wishing to become members of the Society should remit the annual membership fee of $5.00 (U.S. funds at par) direct to the United States Representative:

Professor William L. Mayo
P.O. Box 1
Ann Arbor, Michigan, U.S.A.

(*Continued from page V*)

der whether the specialists do not spend too much time restating the obvious in highfalutin language, and Mr. Wagner cannot wholly escape this charge. A sentence such as "A knife provides the hand with a sharp and firm cutting edge, and produces its effect directly in response to the pressure and draw exerted on it" (page 97); the section in Chapter 6 on "The Meaning of Work"; the summarizing observation, at the end of the book, that "The very original role of man in nature is consequent upon the biological peculiarities of the human species"; — such things hardly encourage a feeling that my vision is being enlarged or my understanding enhanced. Some of the diagrams, too, are less than magnificent. Figure 7, for example, entitled "Production and Consumption Patterns in Space", is pretentious. These instances are perhaps atypical of the book as a whole, but they are marring.

N. T. GRIDGEMAN

Mr. Gridgeman is in the biological Division of the National Research Council at Ottawa.

* * *

Indian Days on the Western Prairies
by Marius Barbeau

(Bulletin No. 165, National Museum of Canada, Ottawa. 234 pp. $4.00)

Anthropological fieldworkers are frequently criticized for neglecting to publish the texts and notes they accumulate in their studies. The volume under review absolves Marius Barbeau from such censure, for in it he publishes the narratives he recorded in a 1926 visit to the Stonies (Assiniboines) on the Morley Reserve, Alberta. The texts read as if transcribed verbatim from the Indian interpreter, and there is no analysis of the recorded material.

Fifty-one pages describing the nations, customs and personalities of the Indians of the eastern Rockies preface the narratives. Much of the introductory section is taken from Barbeau's 1923 work, *Indian Days in the Canadian Rockies*. These chapters are written in the humanistic, belles-lettres style of turn-of-the-century anthropology, and contrast with the more rigorously scientific approach of modern descriptions of Indian groups. Thus, Barbeau neglects the prehistory of his area, gives only a superficial outline of the ecological bases of the cultures discussed, and fails to present the historic situation in the socio-anthropological terms that have clarified events in many recent studies. These 1923 chapters have not only not been rewritten, they apparently have not even been edited, for one encounters such errors as the repetition of the old legend that the horseless Indians tamed wild mustangs: this legend was refuted in 1955 with the publication of John C. Ewers' definitive study of the Indian trade in rustled Spanish horses (Bureau of American Ethnology *Bulletin* 159).

One could excuse the republication of this outdated section, however, were it not that very little of these chapters concerns the western prairies. As the title of the 1923 book indicates, nearly all of the information in this section pertains to the Plateau tribes of the Rockies and the region west of the mountains. Most of the recorded texts, in contrast, are from Assiniboines, a tribe that moved from the eastern prairies to the High Plains only in historic times. Principally because the texts thus come from a radically different ecological area and prehistoric background, the introductory chapters are bewildering and misleading.

The texts themselves, presented as a series of tales, produce an impressionistic picture of Indian days on the edge of the prairies, a picture that dramatically confirms the popular stereotype of the Indian as bloodthirsty, reckless, and fiercely independent. The great warriors of the Stonies are figured again and again, while myths, humorous stories, and personal memories of commonplace events are seldom encountered. In other words, the volume records the last desperate struggles of the pursued tribes to secure the hunting territories necessary to their way of life. These "Indian Days" are therefore scarcely typical of the centuries of aboriginal occupation of the western prairies, though the reader is not warned that he will receive a picture so distorted.

Had the National Museum published these Stony texts in the usual unattractive "scientific" format, minus the introductory section, we would have been delighted to receive them as further source material for analyses of the complex acculturative situation of the historic Plains Indians. But Barbeau's volume is a handsomely designed, eye-catching book with photographs on nearly every one of its slick pages. Portraits of Stonies by W. Langdon Kihn, photographs of painted buffalo hides, and drawings by Indian contemporaries of the elderly Stony informants all will appeal to schoolchildren and the general public interested in Indians. For these readers, an outdated, often irrelevant introduction and a repetitive series of almost-verbatim Indian narratives is not enough. The National Museum owes its supporters publications that can meet the most exacting standards of

contemporary scholarship, yet can sustain the interest and increase the comprehension of the lay reader. The printed material should match the carefully-planned, thoroughly up-to-date layout of the book.

We regret we cannot unreservedly recommend Barbeau's well-written essay and series of texts. His colleagues will thank him for preparing these texts for their use. But the general public still lacks an adequate account of Indian days on the western Canadian prairies.

T. F. and A. B. KEHOE

Dr. T. F. Kehoe is Curator of Archaeology and Ethnology at the Saskatchewan Museum of Natural History, Regina.

* * *

South Asia Travel Guide
by John C. Caldwell
(The John Day Company, New York. 252 pp. $4.50)

In this first jet-age travel guide, a companion piece to his Far East Travel Guide the author deals with the countries of South Asia — India, Pakistan, Nepal, Burma, Ceylon and Indonesia.

As he points out, jet passenger services introduced during 1960 have brought all these countries within a day's flying time of North America, and every capital city in South Asia with the exception of Kathmandu can now be reached by jet passenger aircraft. Without exception these countries are eager to develop the "invisible exports" represented by the expenditures of visiting tourists and they are all now advertising their attractions and welcoming visitors from abroad. An ever growing number of people will undoubtedly respond to these invitations.

In 246 pages Mr. Caldwell tells intending travellers about the formalities with which they must comply in visiting each country, how to plan their trips, what to see and do (and in some cases what not to do) when they arrive at their destinations. There is a wealth of practical information on a wide range of topics in each of the country chapters — for example hotels and their charges and relative merits, local transportation costs, tipping, gift-buying, availability of imported liquors and cigarettes, recommended travel agencies and so on.

Additionally the author provides a number of historical sketches and notes about the peoples of each area, their traditions, customs and religious beliefs, all of which, if absorbed and augmented by personal observation in the country concerned can only add to the pleasure and satisfaction to be derived from the visit.

Mr. Caldwell deals with his subject with the authority of one who has had recent experience at first hand of travel in Southern Asia and his book is recommended reading for those whose finances and leisure permit them to contemplate a close look at the colour and glamour of the East.

J. L. MUTTER

Mr. Mutter works in the International Trade Relations Branch, Eastern Division, of the Department of Trade and Commerce at Ottawa.

* * *

Meet Me On The Green
by Myra Cooley
(William-Frederick Press, New York. 240 pp. $4.50)

The "Green" of the title is one of the rivers of western North America that helps to form the great Colorado. In its vicinity some of the most adventurous men of the past explored, camped, or met, and Mrs. Cooley has pieced together a bookful of incidents and anecdotes from their lives. Jim Bridger, the men who served John Jacob Astor, Jim Bowie, "Bellyful" Bates, Lewis and Clark and dozens of other heels and heroes make up the personnel of this wandering and colourful account of the West before it could be called a part of any one nation.

Actually, the Green River plays little part in the episodes, and the episodes themselves are mostly unrelated. Their main purpose is to give a kaleidoscopic picture of the old West, and they succeed in doing so. Like patterns in a kaleidoscope, they are eye-catching, and each one is gone as soon as the page is turned.

Mrs. Cooley writes well, and she has a good eye for little details and brief adventures. As a consequence, she has prepared a book that will appeal to the busy housewife or businessman who wants something that can be picked up at odd moments. A pleasant contribution to Western Americana rather than an account to grip the reader from beginning to end, it does present a variety of phases of frontier life.

CHARLES PAUL MAY

Mr. May works in the Editorial Department of the Book of Knowledge, New York.

* * *

Recently Received from Publishers

Geography in and out of School. By E. W. H. Briault and D. W. Shave. (Clarke Irwin and Company, Limited, Toronto.) Some timely suggestions for the teaching of Geography in Secondary Schools. An excellent bibliography adds much to the usefulness of this book for the teacher.

* * *

Ordeal by Ice. Edited by Farley Mowat. (McClelland & Stewart Limited, Toronto.) A valuable collection of first hand accounts of arctic exploration from the narratives of sailors from the sixteenth century to present times.